McGraw-Hill DIGEST

MARCH 1951

BUSINESS · ENGINEERING · INDUSTRY

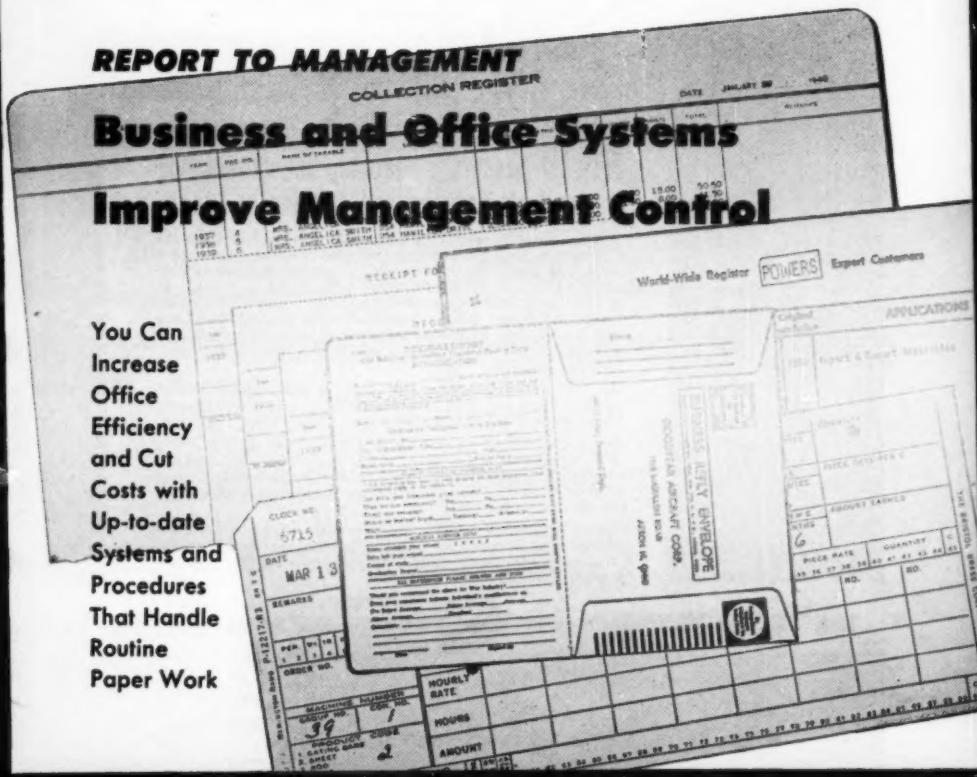
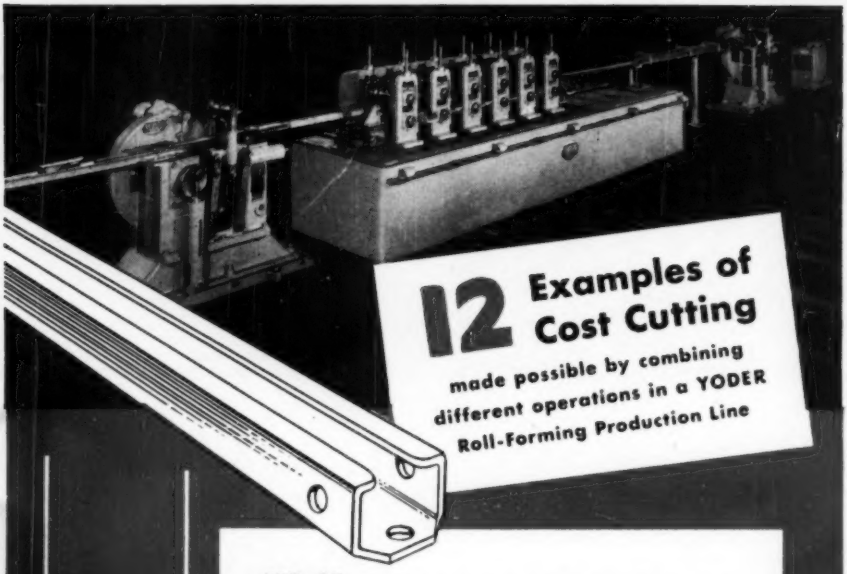
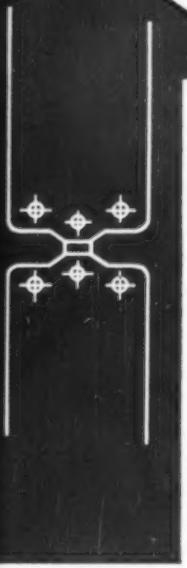


Table of Contents—Page 3



12 Examples of Cost Cutting

made possible by combining different operations in a YODER Roll-Forming Production Line



NO. 10 Notching; Punching Holes; Stamping Name; Roll Forming and Cutting-to-Length

Here's a steel channel, the main part of a patented mirror support—a big improvement on the conventional wood strips for fastening mirrors to the backs of dressers and other furniture. The first three operations are done on the flat strip, as shown in drawing below, in a Yoder automatic shear type press, placed between the coil box and the Yoder roll forming machine. After forming, the finished shape is cut to length in a Yoder Automatic Cut-Off Machine.

All five operations are performed continuously, in a line of four units just mentioned, tended by a single operator. Production is at the rate of about 3000 pieces per hour.

Yoder roll forming production lines may also include auxiliaries for embossing; coiling or curving; making overlapping, open or closed seams; welding; inserting rubber or felt; filling powders, or injecting liquids into tubular sections, etc.

Yoder engineers are at your service, without cost or obligation, in working out production problems involving such operations. Send for 88-page Book of Information on Cold Roll Forming.

THE YODER COMPANY • 5517 Walworth Ave. • Cleveland 2, Ohio

Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS - cold forming and welding

ENGINEERING YODER MANUFACTURING

from Adzing Machines to Mine Hoists

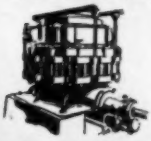
NORDBERG PRODUCTS

are world famous for

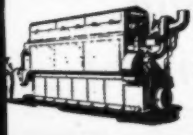
DEPENDABILITY and ECONOMY

NORDBERG ADZING MACHINES (One of many Nordberg track maintenance machines) —widely used to provide level, uniform tie seats in keeping with highest standards.

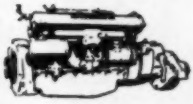
NORDBERG CRUSHING EQUIPMENT—Full range of gyratory, jaw and cone crushers for primary and secondary crushing of ores and industrial minerals. Big capacity at low crushing cost.



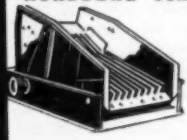
NORDBERG DIESEL ENGINES—For stationary and marine service, 10 to 9600 H.P. Two and four cycle models, oil and gas burning types, supercharged and non-supercharged.



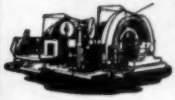
NORDBERG GASOLINE MARINE ENGINES —80 to 145 H.P., for fishing, commercial, and pleasure craft. Direct drive, or with four different reduction gear ratios.



NORDBERG SCREENING EQUIPMENT— Wide range of vibrating screens, feeders and grizzlies for close sizing of all materials, either wet or dry.



NORDBERG MINE HOISTS — Used where materials are hoisted in quantity at high speeds. Wide range of applications vary from 1 to 42 tons per minute, depths from 150 to 10,000 feet.



Write for further details.

NORDBERG MFG. CO., Milwaukee 7, Wis., U.S.A.

CABLE ADDRESS: NORDBERG

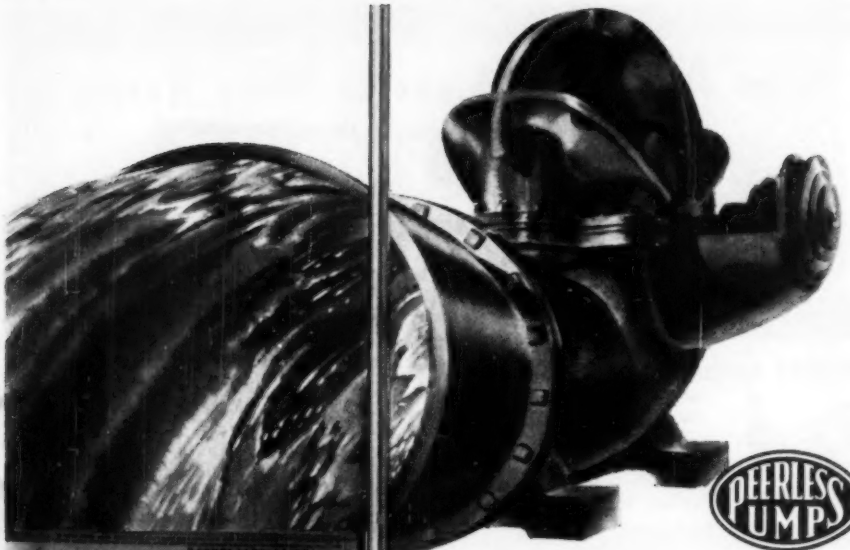
NORDBERG THE WORLD OVER

M-2

LONDON
Broox House, Park Lane

JOHANNESBURG
P. O. Box 4139

MEXICO, D. F.
Dolores 3



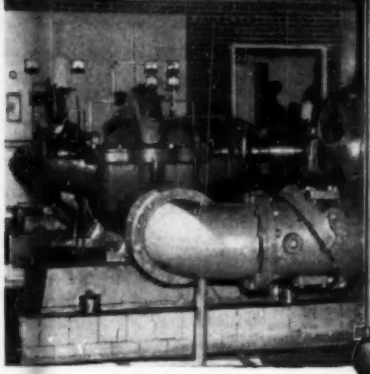
PEERLESS PUMPS

from a tapful

...to a torrent

Performance-wise, in efficiency, dependability, and economy, versatile Peerless horizontal and vertical pumps have established themselves as highly valuable assets on all types of flow lines. Whether they are for industrial, agricultural, or household application, Peerless pumps are aptly named, unsurpassed for pumping most all liquids in most all services.

For complete data on Peerless Pumps, write *Export Dept., Peerless Pump Division, Los Angeles 31, Calif., U.S.A.*



To learn how FMC Division-made products serve industry and agriculture, request booklet E-101.

fmc

FOOD MACHINERY AND CHEMICAL CORPORATION

Representatives in Principal Cities, the World Over.

EXECUTIVE OFFICES, SAN JOSE 6, CALIFORNIA, U.S.A.

FMC CANNING EQUIPMENT

BOLENS GARDEN TRACTORS

FMC FRUIT PACKING EQUIPMENT

NIAGARA AGRICULTURAL CHEMICALS

INTERNATIONAL
McGraw-Hill DIGEST

VOLUME 6
NUMBER 3

Member—Audit
Bureau of Circulations

McGraw-Hill Digest is published monthly by McGraw-Hill International Corp. for circulation in all countries of the world except the United States and Canada. Publication and executive offices, 330 West 42nd St., New York 18, N. Y., U.S.A. Curtis W. McGraw, Chairman of the Board; Willard T. Chevalier, President; Eugene P. Warner, Vice-President and General Manager; Joseph A. Gerardi, Secretary and Treasurer; John F. Chapman, Vice-President; K. Presbrey Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Director of Circulation. *Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill, Aldwych House, London, W. C. 2 (British only).* Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U. S. currency). Entered as second-class matter December 17, 1947, at the post office at New York, New York, under the Act of March 3, 1879.

COPYRIGHT, 1951 by McGraw-Hill International Corp., 330 West 42nd Street, New York 18, New York. Reproduction of items in full or part without written permission prohibited in all parts of the world.

MARCH CONTENTS

Report to Management
Business and Office Systems Improve Management Control 47
Raw Materials Mobilized 15
Improve Plant Maintenance 16
New Process Yields More Sugar 18
Splice Cables On the Job 23
Radioisotopes in Power Plants 27
How To Fabricate Glass Yarns 32
This Month's How To 37
High-Temperature Alloy Tests 44

AVIATION
Camera Frames Flight Data . . 33
Self-Aligning Bearing 35
Rotor Turns on Air Bearing . . . 38

CHEMISTRY, METALLURGY
Mesh Traps Entrained Vapor . . 24
Iron Growth Characteristics . . 26
Pain Killer to the Front 46

CONSTRUCTION
New Tool for Pile Driving 20
Timber Arch Bridge 31
Bridge Built of Blocks 36

ELECTRICITY, POWER
Inhibits Transformer Oil 25
Teaches Line Construction . . . 29
European Power Revival 34

ELECTRONICS
Low-Reflection TV Tubes 21
Measures Gas Pressure 28
Low-Cost Electronic Organ . . 42

FOOD PROCESSING
Shrinks Smoked Meats Less . . 22
Concentrates Grape Juice . . . 29
Glass Baffle Balks Air 34

MECHANICAL DESIGN
Compressed-Air Generator . . 22
Steam Nozzle Aids Chip Flow . 29
Refines Dirty Oil 43

METALWORKING
Automatic Belgian Mill 24
Magnesium Parts Hot-Formed . 34
Cutting Wedge-Shaped Slots . 39

MINING, PETROLEUM
Drills Shot Holes With Air . . 20
Improved Alkylation Process . . 35
Fast Mining in Low Coal 39

PLANT MANAGEMENT
Private Showing Television . . 24
Conveyor Dispatches Work . . 33
Jumps Machine Time by 60% . 36

TEXTILES
Measures Shrink Potential . . . 25
Put Viscometer on Slasher . . . 26
Process Imparts Crimp 28

TRANSPORTATION
The Car of Tomorrow 26
Keeps Oil From Freezing . . . 45
Removes Carbon Monoxide . . 39

172 Items in This Issue

John F. Chapman *Publisher*
Harry S. Wharen *Editor*
Joseph A. Cohn *Assistant Editor*
Dexter M. Keezer *Economics Dept.*
Russell F. Anderson *Editor, World News*
George B. Bryant, Jr. *Washington Bureau*

investigate

DOW GLYCOLS

the versatile chemicals

TODAY Dow glycols are used in many varied industries for *product improvement* and *lower processing costs.*

Well known for their freezing point depressant qualities in automobile and industrial antifreezes, they have many other chemical traits that make them valuable to manufacturers. For instance, their ability to readily absorb moisture leads to their use as a moistening agent in tobacco and for dehydrating natural gas. As a plasticizer or solvent they are used in the processing of Cellophane, cork, perfumes, cosmetics, glue and resins.

These many applications of glycols may suggest how they can serve you. If you desire additional information, write to Dow.

SOLVENTS

Industrial degreasing is simplified and becomes free from fire hazards when Dow chlorinated solvents are used. These nonflammable solvents leave the parts clean and dry . . . ready for the next manufacturing process. Dow chlorinated solvents are also ideal for dry cleaning clothing because they have excellent solvent power, leave garments odorless and are nonflammable. For added information, write to Dow.

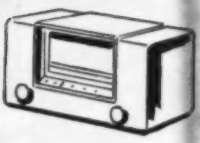
DOWICIDES

Losses of material and man hours, caused by mold and bacterial attack, can be greatly reduced by using Dowicides. Fourteen different Dowicides, each compounded for a specific job, can help you control microorganisms in processing paint, paper, leather, textiles, lumber, adhesives, petroleum and disinfectants. Produced in oil and water soluble types. Write for details.

ARE YOU FAMILIAR WITH THESE HIGH-QUALITY DOW PRODUCTS?

AMINO ACIDS

Dow is cooperating in a long range research program to make available essential amino acids. Already produced synthetically in quantity by Dow is DL-Methionine, effective in treating diet deficiencies of man and animals. Other amino acids will be supplied for experimental purposes. For further information write to Dow.



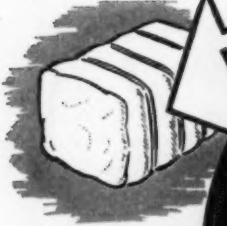
PLASTICS

STYRON (Dow Polystyrene) is an outstanding thermoplastic material capable of being fabricated into many end products. Many manufacturers depend on its bright sparkling colors to bring added sales appeal to their products. Others prefer it to cut production costs by increasing output and simplifying assembly and finishing operations. Contact Dow for full information.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN, U.S.A.

DOW CHEMICAL OF CANADA, LIMITED
TORONTO, CANADA

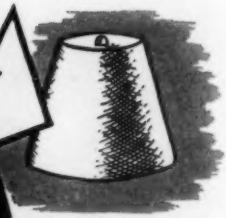
DOW
CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE



FROM BALE

IN TEXTILE MACHINERY

YOU CAN RELY ON H&B



TO TWISTED YARN

H & B REVOLVING FLAT CARDS

An H & B card installation at the 20,000-spindle Kohinoor Mills at Lyallpur, Pakistan. Cards are individually motor driven and are adjustable at five separate setting points.

Whether it's one machine or a hundred . . . changing over one line or completely equipping a cotton spinning plant . . . you can count on H & B for quality performance.

In addition to manufacturing and installing the machinery you need, H & B will figure what machines and in what quantity you require for a given yarn organization. You will be furnished with a complete floor plan which will assure efficient straight-line production.

Tell us your problem in detail and let us make recommendations.

H&B AMERICAN MACHINE CO.

Factory, Executive Offices and Export Division
Pawtucket, R. I., U. S. A.
Distributors Throughout the World

Builders of MODERN TEXTILE MACHINERY

OPENING MACHINERY • ONE PROCESS PICKERS • REVOLVING FLAT CARDS • DRAWING FRAMES • ROVING FRAMES (REGULAR AND HIGH-DRAFT) • SPINNING FRAMES (REGULAR AND HIGH-DRAFT) • TWISTERS • RUBBER COVERING MACHINES • ROVING TESTERS

Business Trends

PRICE AND WAGE CONTROLS will not stop U. S. inflation. They will just dampen it. Even goods with prices rolled back now will cost more within a few months.

Prices are subject to too many pressures. Consumer demand is growing as the supply of consumer goods falls. Costs of doing business rise as labor demands pay increases to keep wages in line with the cost of living. Manufacturers need higher prices to cover the cost of bigger payrolls and rising prices of raw materials. Some sources of pressure:

- **Metal products for consumers** may almost disappear by fall. Less soft goods and even less food will be available for civilians.
- **Food prices put heavy pressure** on the cost of living, encourage labor's demands for higher pay. Even though prices received by farmers went up 23% in 1950, some food prices still cannot be controlled legally.
- **Total U. S. personal incomes** are expected to rise 10-15% between last December and the next—partly because of pay boosts, partly because of higher levels of employment and longer hours of work. Taxes will take away some of the gain, but part will remain to bid up prices.
- **Business demand for raw materials** will continue high, as U. S. military spending grows to an annual rate of over $50-billion by year's end.
- **Prices of imported raw materials** are hard to control. The U. S. has the same problem as Europe—raw-material prices are promoting inflation.

Lack of the patriotic incentives of full-scale war makes enforcement of rigid controls on prices and wages impossible. The U. S. learned this after World War II, when controls collapsed as patriotic fervor declined. So Washington will have to respond to inflationary pressures by allowing periodic upward adjustments in prices and wages.

The U. S. will take other steps to control inflation. Taxes will be increased, credit terms tightened, savings encouraged. Commodity imports may be subsidized if international control of raw materials cannot be developed.

But prices will still rise—perhaps 8-10%, and even more if controls are not forcefully administered. With consumer demand at record levels this fall, the U. S. may have to resort to rationing of consumer goods.

SHORTAGES OF CHEMICALS in the U. S. are rapidly becoming serious. The American chemical industry has been growing rapidly since World War II, yet production of basic chemicals still has not caught up with the huge demand. That was true even before Korea. Now mobilization, which falls heavily on chemicals and their products, makes potential shortages worse.

As demand grows, Washington is gradually being forced to put controls on industrial chemicals. So far, controls apply only to a small part of the total

Business Trends (Continued)

output. Later this year, distribution of all major chemicals may be government-directed. Exports—not yet limited by government—are being cut by producers.

Chlorine was the first chemical under federal controls. U. S. consumption has doubled twice since 1939—it was 11% more last year than in 1949—and demand is still rising. The pinch on chlorine will be tight; it is needed for water purification and sewage treatment as well as for military production.

Sulfur products, especially sulfuric acid, will be short—in spite of a 150% increase in production since 1939.

More glycerine is needed for explosives. Soap manufacturers, who make it as a by-product, cannot increase output much. Petroleum companies are expanding glycerine production, but a serious shortage is expected this year.

Demand for industrial alcohol, needed in making synthetic rubber, is soaring. The U. S. used about 180-million gallons in 1950, exclusive of a small synthetic rubber output. This year consumption may pass 300-million gallons, including 140-million for rubber. Delivery of 120-million gallons purchased from France will increase supplies, but a severe shortage is in prospect.

Benzene supply is a major problem. U. S. production was about 165-million gallons in 1950, should reach 170-million in 1951. But demand—for synthetic rubber and plastics—is expected to grow 20% or more in the same period. Most new facilities will not be ready until 1952.

Imports may help ease some of these shortages. The U. S. will use all it can get. But needs are so great, especially for alcohol and benzene, that shortages will be severe through 1951.

BIGGEST, FASTEST EXPANSION in history is the goal of the U. S. steel industry. Acceleration of expansion is already well under way. U. S. capacity in January had almost reached the pre-Korea goal for late 1952.

Before Korea, plans called for 6,363,000 tons of new capacity in 3 years, 1950-52. After Korea, expansion speeded up so much that almost 5-million tons were added in 1950 alone. U. S. capacity now stands slightly over 104-million tons—more than the 1950 output of all the rest of the world.

Plans for future growth are still being raised. In October 1950, capacity for late 1952 was scheduled at 110-million tons. Now steel companies, aided by government tax concessions, have raised their sights to 117.5-million tons. That would represent growth of 45% in steel capacity since 1940. And the goal is still rising, may reach 119- or 120-million tons.

The record expansion means more steel for civilian goods sometime in 1952. New capacity will cover a good slice of military needs. But shortages of special alloy steels will last longer.

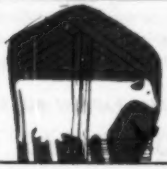
MAKE WOOD LAST LONGER

IN MANY TYPES of construction, wood lasts much longer when protected with solutions of Santophen 20 — Monsanto's pentachlorophenol. Often called "penta," this chemical wood preservative pays for itself over and over, since penta-treated wood resists rot and insect attack. Penta stays in the wood and remains effective because it does not combine with water. When properly formulated it gives a clean treatment. The more valuable the structure, the more valuable the treatment. Use lumber that is penta-treated with Santophen 20.

Wood preservation by pressure treatment is a subject on which Monsanto can supply valuable information — often to the point of directing you to a proved source for building and operating low-cost, highly efficient pressure-treating plants.

Electric light and telephone poles can be either full-length or butt treated with Santophen 20 solutions. Pole life is increased many years, maintenance and replacement costs are minimized.

Capital investments in heavy construction — bridges, docks, piers, loading platforms — are safeguarded when structural timbers are protected with Santophen 20 solutions. Treatment is especially valuable where construction is exposed to weather.



Farmers profit by using building lumber and fence posts protected with solutions of Santophen 20. Repair and replacement costs are greatly reduced.

Santophen: Trade-mark registered.

MONSANTO CHEMICAL COMPANY, *St. Louis 4, Missouri, U. S. A.* • MONSANTO CHEMICALS LTD., *London* • Monsanto (Canada) Ltd., *Montreal* • Monsanto Chemicals (Australia) Ltd., *Melbourne* • Monsanto Chemicals of India, Ltd., *Bombay*. Representatives in principal cities.

MONSANTO
CHEMICALS — PLASTICS

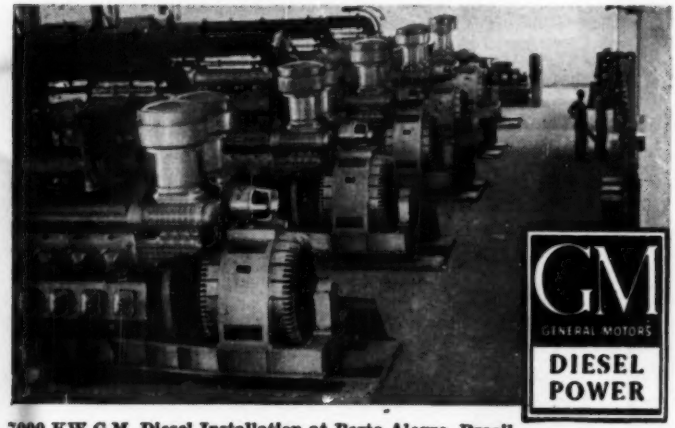
Serving Industry ... Which Serves Mankind

GENERAL MOTORS

The World's Greatest Producers of DIESEL POWER

(73,170,380 HP thru Dec. 1950.)

Industrial Diesel Generator units of 350 to 1000 KW output are operating in, or ordered for, the following countries:



7000 KW G.M. Diesel Installation at Porto Alegre, Brazil.

ANGOLA
ARABIA
ARGENTINA
AUSTRALIA
BELGIAN CONGO
BOLIVIA
BRAZIL
BRITAIN
CAMEROONS
CHANNEL ISLES
CHILE
ECUADOR
EL SALVADOR
GREECE
INDONESIA
ITALY
MEXICO
PORTUGAL
PERU
SOUTH AFRICA
TRINIDAD
VENEZUELA

GM DIESEL GENERATOR UNITS ARE:

Easy and inexpensive to install, shipped fully assembled from factory;
Easy to operate, due to automatic devices controlling lubrication, cooling and load;
Easy to maintain, due to interchangeability and light weight of parts;
Reliable and economical in operation, due to GM unit injectors, uniflow scavenging and other exclusive features.

FREEDOM FROM POWER LIMITATION PAYS DIVIDENDS

GENERAL MOTORS OVERSEAS OPERATIONS

New York 19, New York, U.S.A.

For Information Address GENERAL MOTORS at . . .

ARGENTINA	Buenos Aires	ENGLAND	London, S.W. 1	PERU	Lim
AUSTRALIA	Melbourne	FRANCE	Paris	PORTUGAL	Lisb
BELGIUM	Antwerp	GERMANY	Russelsheim/Main	SOUTH AFRICA	Port Elizabe
BRAZIL	Sao Paulo	INDIA	Bombay, No. 1	SPAIN	Barcelo
CUBA	Havana	INDONESIA	Djakarta	SWEDEN	Stockholm
DENMARK	Copenhagen N	MEXICO	Mexico, D. F.	SWITZERLAND	Bien
EGYPT	Alexandria	NEW ZEALAND	Wellington	URUGUAY	Montevid
		PAKISTAN	Karachi	VENEZUELA	Carac

Washington Report

FOREIGN REQUIREMENTS have Washington mobilizers in a state of confusion. Machinery is being set up to assure the western world a fair share of the available supply of essential civilian and development goods. But lack of definite information on what is needed abroad plus a still vague estimate of what U. S. rearmament will take out of U. S. production promises to make your buying in the U. S. a confusing business for the rest of this year.

The bottleneck is military requirements both here and abroad. Military officials figure they may take 14% of U. S. steel output by year's end (double the present rate); over 40% of the available copper supply (as against 15% now); and 35% of the available aluminum (a 25% cutback in civilian use of aluminum has already been ordered).

But the figures do not tell the whole story. They make no allowance for essential supporting production like steel for freight cars. Until Chief Mobilizer Charles Wilson can add up all these indirect military requirements, he will not know how much is available for export.

FOREIGN-REQUIREMENT POLICY will be set by ECA-Chief William C. Foster, who has been named by Wilson to do the job. Officials like to say that allied populations will get equal treatment with the U. S. population. But foreign diplomats in Washington, particularly Latin Americans, are skeptical.

Foster's first job is to present Wilson with an idea of what volume of exports must be kept moving. Under the direction of the Commerce Dept., foreign-service staffs abroad have been increased to keep a steady flow of information on essential requirements flowing into Washington. International business groups, like the International Chamber of Commerce, have been asked to help.

Foster's second job will be to form a single operating agency—like the Foreign Economic Administration of World War II—to handle all U. S. economic operations overseas. The agency will probably be built around Foster's own ECA. New functions will include:

- **Development:** The agency will absorb the Point Four program and forthcoming development aid to South Asia, including the $200-million food program for India. Strategic-materials development, now split between ECA and Point Four, will be united under the new agency.

- **Raw Materials:** The new agency may serve as U. S. representative on the Central Group and the commodity subgroups of the new inter-allied raw-materials pool (see p15). Where the U. S. is a primary raw-materials exporter, the agency would be charged with allocating supplies available for export.

- **Export Priorities:** The agency's toughest job will be to get U. S. suppliers to take foreign orders on a priority basis. Officials expect to be issuing export

Washington Report (Continued)

priorities within a month or two. But by that time so many priority orders will be flowing out of Washington that many manufacturers will have a lot of leeway to pick and choose.

Priorities for supplies financed by development loans may also be troublesome for the new agency. Both World Bank and Export-Import Bank are now in the market for new money. World Bank, whose uncommitted dollars virtually disappeared after the $50-million loan to South Africa in January, is trying to raise upward of $100-million in the private market.

Export-Import Bank has asked Congress to increase its lending authority by $1-billion. Ex-Im Bank has only $500-million uncommitted funds left from its current reserve of $3.5-billion.

LATIN AMERICAN MANPOWER, according to Washington, will be needed if another war comes. Not only will troops be needed, officials say. They think Latin American farm and factory labor may be welcome in the U. S. too.

Initial soundings by the State Dept. were greeted with a quick "No" from most South American countries when it came to workers for U. S. factories and farms. The Latins are willing to produce for Western rearmament within their own borders, but not otherwise. Plans for raising Latin American fighting manpower are facing far fewer obstacles. The U. S. is offering them equipment and training.

STRATEGIC-MATERIAL PROJECTS abroad will get dollars a lot easier from now on. ECA has been authorized to spend dollars for local costs and non-dollar foreign-exchange costs of strategic-materials projects. Until recently, ECA could only meet the dollar component of a strategic-material project. For the first time, too, ECA will finance strategic development in the Far East. Projects are being considered in Indonesia, Thailand, and the Philippines.

U. S.-JAPAN SETTLEMENT now seems likely this year. Many other nations may follow suit. The U. S. is in effect acting as intermediary between Japan and the various members of the Far Eastern Commission.

A real peace treaty is, of course, out of the question. Japan may eventually make its own terms with Russia and Communist China. That is a risk the State Dept. is frankly taking. Also unsettled will be the question of Formosa. State Dept. officials say the best they can hope for is no decision for 3 to 4 years.

Plans are already being laid to fit Japan into U. S. aid programs. With China out as a supplier, the U. S. will have to subsidize Japan with cotton, iron ore, oil, coking coal, and the like for some time. Japan may be able to pay for part of this material by suppling some of Southeast Asia's development needs, which would otherwise have to come from the U. S.

He plays with the future

The little boy's toys are very real to him. He plays at fueling his truck with gasoline from a toy pump. He sails his boat filled with imaginary passengers. His automobile runs on a road crossing the whole room. All the while, he is being educated in a great modern phenomenon — today's transportation.

Through his play, he is learning the importance of fuels, lubricants and other petroleum products which are necessary to run motor cars, trucks, ships and planes.

Right now, Esso's research people are working in their laboratories to develop new forms of petroleum which will be even more useful and efficient. These will help in the continuing improvement of land, sea and air transport. When the little boy grows up, he will be able to enjoy transportation that is even more comfortable and convenient than now.

Petroleum helps to build a better life.

Stop at the nearest Esso Sign for Quality Petroleum Products and Service.

Cyanamid

quality means economy to you

PREVENTING OXIDATION and protecting engine parts from the harmful effects of organic acids and oxidation products . . . that is one of the many functions of Cyanamid's AEROLUBE® Additives. Less than 1% of these additives, when blended with lubricating oils will help maintain oils for peak engine efficiency over the wide range of speed, temperature and road conditions encountered in today's automobile and truck operation. Write for more information.

LEATHER IS FIRST CHOICE for shoes where long wear and good appearance are desired. To give leather these qualities, tanners have learned from experience that Cyanamid's TWE-COTAN® Tanning Extracts give the results they desire. Used chiefly in retanning chrome leather, these extracts produce a more uniform, smoother grained, better colored leather that enhances the beauty and saleability of the finished product.

"THE CLEANEST ROOMS IN THE WORLD" is the phrase that best describes the chambers where world-famous Lederle pharmaceuticals are packed. Each of these gleaming, sterile rooms is completely air-conditioned and fully irradiated with germ killing ultra-violet light. Such care helps assure the effectiveness of drugs such as Lederle's parenteral products—including FOLVITE® Folic Acid, NORMOCYTIN® Vitamin B_{12a}-B_{12}, and Liver Extracts. These products are saving lives around the world.

INFORMATION ON THESE AND OTHER CYANAMID PRODUCTS for drug, textile, leather, rubber, paper, ink, plastics, paint, mining and other industries is available on request. Write for more information or see one of our representatives, who will be glad to help you.

AMERICAN Cyanamid COMPANY

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

REPRESENTATIVES THROUGHOUT THE WORLD

March 1951 • McGraw-Hill DIGEST • Volume 6 Number 3

Raw Materials Mobilized

- Producers and consumers will work out controls and set production programs for individual commodities
- Commodity groups will make the decisions, which will not be binding on various governments represented
- Each consuming nation will have to fix distribution of goods allocated between military and civilians

MACHINERY FOR MOBILIZING the free world's raw materials is fast taking shape. It is a result of the President Truman and Prime Minister Atlee talks.

Representatives of both nations plus those of France have organized a series of international conferences to set up a program to expand, conserve, and assure effective distribution of scarce goods.

Invitations to the conferences have gone out to virtually every nation outside the Russian bloc—including West Germany, Japan, and Yugoslavia.

Organization of Program

On top of the organization will be a Central Group consisting at first of the U. S., the United Kingdom, and France; other nations and international organizations will join later.

The Central Group will set up a whole string of commodity subgroups, with producers and consumers represented, to work out controls and production programs for individual commodities. The Central Group will act as an executive secretariat, or steering committee. The commodity groups will make the decisions—which will not be binding on the various governments.

The new program, if carried out, means ultimately that each producer nation must undertake allocation of the commodities concerned. At least they will regulate what is consumed internally and what is exported. And it will mean that each consuming nation will have to control distribution of the commodities allocated between the military and civilian needs.

Chief obstacle to the plan is the fact that it will depend entirely on the voluntary cooperation between a large number of nations that are not under pressure of actual war conditions.

Chances are these raw materials will be affected first: nonferrous metals—surely copper and zinc—and some alloying agents of steel, such as manganese and nickel. Later, groups will be formed for rubber and tin. Later still, the problems of wool, cotton, and cotton linters will be tackled.

Consumer-Nations' Problems

The problems of consumer nations will be complicated as the question will arise as to whether each nation is fulfilling its part of the rearmament campaign. It will be hard to determine to what extent it is entitled to raw materials for purely civilian purposes. European neutrals, like Switzerland and Sweden, also present special problems, as do South American countries.

Just what roles the various international bodies like the Economic Cooperation Administration and the Organization for European Economic Cooperation will play has not been decided as yet. It seems to be the intention to make them subordinate to the Central Group to be established in Washington, D. C.—Business Wk, Jan 13, p28

Improve Plant Maintenance

Industry, producing more goods than ever before, will need the best maintenance. Here is how to get the most for your maintenance money

TWO MEN, the plant manager and the plant engineer, determine the best maintenance program for a plant. When the plant engineer knows what management expects—and when the plant manager knows what the plant engineer thinks is best—then the two can work together on a suitable program.

Factory magazine has gone to both plant managers and plant engineers and has asked them: "What kind of maintenance program would you set up?" Here are some of the answers.

"My first aim would be control"
says Manager, Technical Services Div., Kingan & Co.

Control schedules the work, it indicates requirements of maintenance materials, and it keeps cost records.

The plant engineer should report directly to the plant superintendent. Under the plant engineer would come the foremen of the various maintenance crews. Also under the plant engineer would come the storeroom in which maintenance supplies are kept and cost records accumulated.

Trouble is first reported to the department foreman, who in turn makes out a work order and briefly describes the work to be done. The order then goes to the plant engineer.

All the information necessary to make the repairs is gathered from a file. The plant engineer is now in a position to study the order, procure any necessary materials, and schedule the work. The order then goes to the shop making the repairs. Material for the repairs is obtained at the storeroom by a supply requisition.

Labor and materials charges are summed up, and the work order is returned to the plant engineer. Cost and description of the work done are entered on the equipment record. This provides an accurate maintenance history on each piece of equipment.

"I'd pay special attention to these things"
says Works Engineer, E. I. du Pont de Nemours & Co.

Organization is most important. The organization reporting to a plant engineer can vary over wide limits, depending on type and size of a particular plant. Small plants could operate with the foremen reporting directly to the plant engineer. Large plants with 150 to 300 or more mechanics should be well staffed with capable engineers. Each one would be responsible for specific phases of the maintenance work or specific areas of the plant.

Mechanical shops should be located advantageously within the plant; if possible, they should be centralized. Equipment must be up-to-date.

Maintenance activities should be scheduled from a central point, coordinating work requests with backlog priorities. Repetitive overhauls should be set on the proper frequency basis. Scheduled inspections of major pieces of equipment constitute the essence of a preventive-maintenance program.

"Good men, good tools, good planning"
says Plant Engineer, Gould & Eberhardt, Inc.

Maintenance men should be fully trained and generally more competent than the average production worker. They have to face situations where they become managers and must organize and make decisions that can be costly in money and safety.

Try to hire skilled mechanics. Assign them specific duties. This will pay

dividends when breakdowns occur or adjustments have to be made.

Have the right tools and enough of them. Investigate your tool stock. Discard worn-out, obsolete tools. Replace them with up-to-date tools.

The third step of your program should be the planning of your work. Make a survey of your plant. List all items that require service. Group them according to the service required and the frequency. Analyze every item of equipment for the type of servicing, the time it requires to service it, and the frequency of the servicing.

"First an inventory of equipment"
says Supervisor, Canadian General Electric Co.

The first thing you need is a complete inventory of all equipment, flexible enough to include new equipment as it is installed. All information pertaining to each machine should be carefully recorded.

Estimating is done on a form showing the article or material, quantity, unit price, and total cost.

The order form includes all items necessary for the installation. It also contains sufficient information to enable the service department to make the complete installation.

When these forms are completed, the service department is advised to go ahead with the installation. An order card outlines the work to be done and indicates the time to start and finish the job.

A complete list of replacement parts is made up by the plant-engineering department. It is now the responsibility of the stores to order the recommended parts and replace the stock as the items are used.

An instruction bulletin that contains not only maintenance instructions, but also plant-engineering-department routine and operating and installation instructions is set up.

A suitable form for maintenance control includes identification of equipment, machine number, its department and location, maintenance interval, and maintenance instruction.

"Cooperation and good records"
says Chief Engineer, Lee Rubber & Tire Corp.

Trouble calls are handled promptly and in a routine manner. If it is serious, the master mechanic is immediately called on a public address system. Otherwise, his attention is called to such minor cases on his next stop at the plant-engineer's office.

Routine maintenance work is handled by issuance of a work order. This originates in the chief-engineer's office and is delivered to the master mechanic for execution either at or before a specified time.

Complete records are kept of all equipment in the plant. Records are also kept of major spare parts on hand. The record provides space for the number on hand, when used, when ordered, and when received.

"Analyze plant, conditions—and yourself"
says Plant Engineer, Philco Corp.

Basic principles of an ideal maintenance setup are to: (1) Analyze the plant, (2) analyze conditions, and (3) analyze yourself.

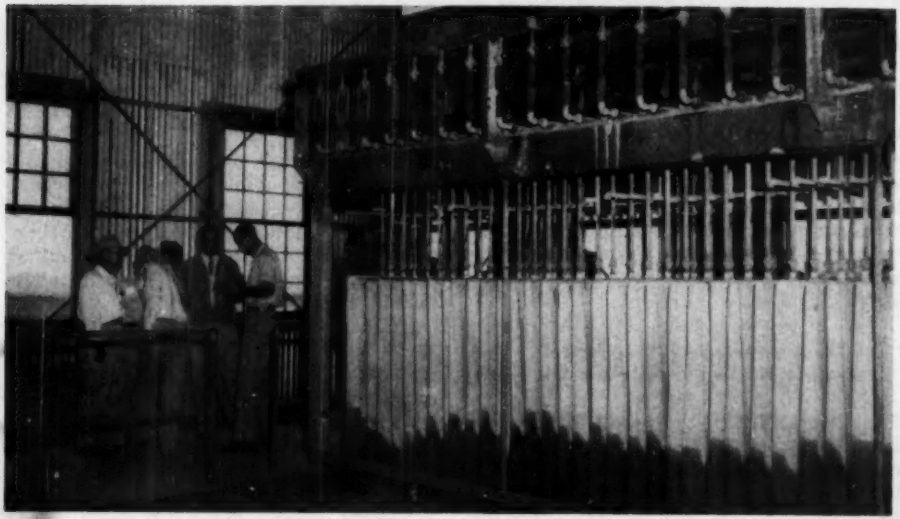
Then, organize a strong routine inspection system. Give full attention to all items, but concentrate on the important features.

Organize shop and field crews to handle essential construction as related to your product. Be competitive.

Continuity of production depends on a reliable power supply. Plan it properly and do not neglect it.

Be logical about cost control; it is important. Be budget-conscious, but try to work out a practical budget. Have fixed and variable allowances that will permit you to meet responsibilities at all levels of activity.—Factory, Jan, p81

Vacuum Filter Plays Vital Role in . . .



HYDROMATIC FILTER, as it looks when withdrawn from its tank, consists of 46 nylon leaves. Internal coils keep them spread during suction. The filter operates at 1-15 in. of vacuum.

New Process Yields More Sugar

Sugar yield up 5-8%, polarization to 99.87, hours saved in processing time, faster crystallization are among the advantages of new process

GREATER RECOVERY, higher polarization, faster processing time, lower in-plant inventories, and fewer boiling-house troubles are reported achieved with a new sugar clarifying process. It is in successful operation at the Grove Farm Co.'s Koloa Mill in Hawaii.

The technique, known as the Elguanite process, was developed by J. J. Naugle, president of Elguanite Corp.

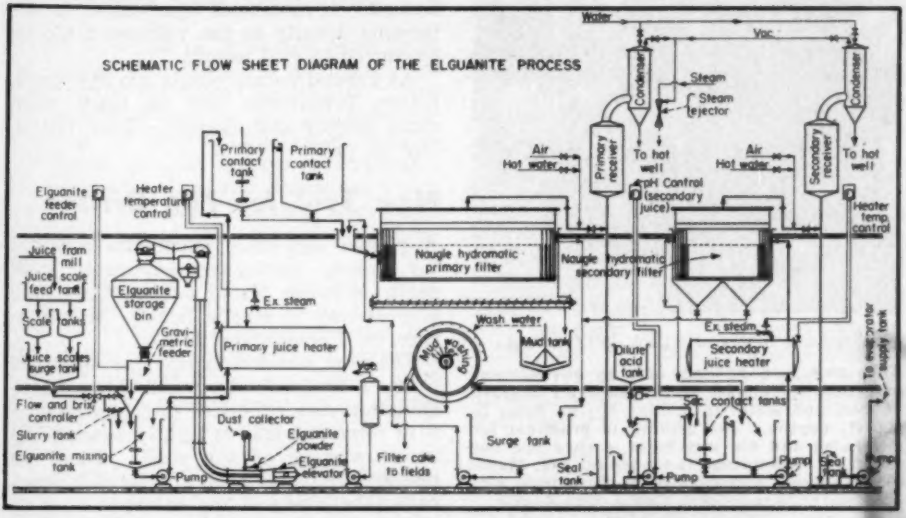
Milk of lime, which since 1685 has been the usual sugar defecator, has been replaced in the new process by a dry white powder made up of specially processed earth metals, in the form of carbonates, hydroxides and oxides, and a number of trace elements. The powder acts on the cane juice as a clarifier, precipitating agent, and filter aid. It performs both as an absorber and as an adsorber.

Treatment with the powder produces a brilliantly clear juice. The reaction forms a flocculent precipitate of the organic impurities. To these cling the organic-materials simultaneously thrown down as microscopic nodules in a discontinuous structure. Impurities are filtered out.

Raw mixed juice is fed to the surge tank, then to the mixing tank. Powder is fed into the mixing tank from a Gravimetric feeder, which adds a quantity equal to 2½–3% of the soluble solids contained in the juice.

Treated juice is heated to 79–95° C.,

. . . This Sugar-Clarification Process



***FLOW DIAGRAM** outlines the Elguanite process step by step, indicating juice and powder addition, mixing, heating, filtering, pH control, reheating, and refiltering.*

pumped to contact tanks, then to the hydromatic primary filter. Time interval from heater to filter is 10 min. The filter removes the flocculent precipitate. From 70–80% of the color is removed at this point.

Filtered juice is mixed with phosphoric acid to reduce pH to 7.2–7.5. It is then reheated to 83–93° C. and pumped to contact tanks and the secondary filter to remove the fine flocculent precipitate of insoluble phosphates that has formed. The second filtration improves color still further and reduces ash content. The clear juice is then sent to the evaporators.

Among processing advantages of the new process is that the raw sugar presents a substantially improved product for the refiner. Ash content is reduced, the adhered molasses film on the sugar crystal is practically eliminated, the sucrose crystal is harder, all of which creates simpler, less costly processing. Keeping qualities are improved, and storage deterioration is reduced.

Less blackstrap molasses results from use of the powder clarifier. The molasses contains one-third less sucrose, thereby accounting for part of the increased yield.

Purity of the powder-processed sugar represents such an improvement that 98.5–99.2° raw sugar is practical. Koloa Mill's washed raw "A" strike dried sugar has shown a polarization of 99.87. If desired, powder-processed sugar can be washed with a little water in the basket and dried to a practically white condition.

A definite advantage of the process is that less scale forms in the evaporators. Most of it is in the first body. The scale is soft, friable, and easily removed without use of caustic soda.

Syrups going to the pan floor are light colored, clean, and of low viscosity. This results in better pan boiling, better circulation in the pans, and quicker strikes. —Food Ind, Jan, p58

DRILLS SHOT HOLES WITH AIR

This shot-hole drilling unit in oil-well exploration work uses compressed air instead of mud and water in drilling 4½-in. holes to 200-ft. depths. Air drilling is practical for dry holes and for wet holes if they are not too deep. Advantage is longer bit life. Major disadvantage is that it costs more than circulation drilling.—Oil & Gas J, Dec 7, p60

Air Photographs Inventory Coal Piles at 25% Saving

Last fall the Philadelphia Electric Co. took inventory on its 39 widely scattered coal piles from the air instead of by rod-and-level survey on the ground. Advantages: much less time needed, results accurate to within 3–5%, inventory cost 25% less, and one inventory date for all stockpiles.

Aerial "Stereo" photographs that overlapped 55% were made of each stockpile from 1,200 ft. The airplane traveled about 1,000 ft. between pictures, giving a large third-dimension effect. Also, a ground survey crew established a network of datum points of known elevation and separation for plotting contours.

The aerial photographs were then studied through a stereo-plotting machine, and a contour map of each coal pile was constructed with a 1-ft. contour interval. The area of each 1-ft. layer was then measured with a polar planimeter, and volumes were calculated. Samples in stockpiles were taken to determine density so the volumes could be converted to coal weight.

As ground datum points are now fixed, future inventories can be made even more quickly and cheaply.—Elec World, Dec 18, p88

New Tool for Pile Driving

A rubber and steel pneumatic mandrel for sinking light-gage corrugated steel shells is being tested on the Olneyville Expressway in Rhode Island. Manufacturer is Pneumatic Pile Co.

The new mandrel is inserted—deflated—into a commercially available uniform-diameter shell. Bottled nitrogen inflates it to force and hold it tightly against the inside surface of the shell. Thus the mandrel grips the shell and takes it down under the blows of the hammer.

At refusal, a valve is opened to deflate the mandrel; it is withdrawn, and the shell is filled with concrete. A cap welded on the shell's bottom keeps it dry (to depth of 120 ft in water-bearing strata on this job).

Since the mandrel actually drives against the walls of the shell, this bottom plate is not hammered out; and since the mandrel tip fits snugly against it, the bottom plate is not battered in.—Eng News-Rec, Jan 11, p35

LOOK FOR . . .

. . . the report to management, Business and Office Systems Improve Management Control, beginning on page 47. It can help you increase office efficiency and cut costs. Management control systems for inventory analysis, sales control, production control, and personnel administration are explained. You will also find in the report a section devoted to office study methods. It can help you analyze your office routine and make the improvements necessary to a successful operation.

Power Spinning Eliminates Annealing and Descaling

Power spinning of truncated cones from flat disks has simplified production of bowl shells for cream separators at International Harvester Co. The spinning, done on an unusual hydraulic machine developed by the company, eliminates need for annealing and descaling, which followed the press-drawing operations formerly used, and reduces polishing time.

The machine has a vertical work spindle on which the spinning mandrel fits. A hydraulic cylinder operates the hold-down. The carbide-faced spinning roll is traversed across the disk to form it to mandrel shape by the action of two hydraulic cylinders at an angle to each other.

Material rolled is type 302 stainless steel. Blanks of 8 to 10¾ in. in dia. are 0.140 in. thick. Thickness is reduced by spinning to 0.105–0.109 in.

Following the single spinning operation, shells are trimmed on the OD to remove the lip left by spinning, drawn to final shape, pierced in the center, and formed at the neck in a three-station die. One operator taking care of all machines makes one finished bowl per minute.—Am Mach, Dec 25, p114

Low-Reflection TV Tubes

Television-tube faces are prone to specular reflections because of their high optical quality. These reflections of external light sources in a room are particularly noticeable with dark-glass face plates.

A method has been developed at the Rauland Corp. to reduce undesirable reflections. The surface of the plate is etched either chemically or by liquid honing (an abrasive blasting method).

The etched surface diffuses the light and reduces specular reflection but also tends to deteriorate the quality of the transmitted image. So the plate is treated with hydrofluoric acid until transmitting properties are restored.—Electronics, Jan, p97

Process Gives New Effects

A new embossing process creates the illusion of depth on surface-decorated plastics film and sheet. Developed by Dr. Paul Dornbusch, West Germany, it is based on a study of light reflections and the creation of patterns that pick up and reflect light at various angles.

The motif is broken up into areas of parallel lines set down in different directions to make up the all-over design. When the film bearing the design is turned or moved, the lines show up in different shades of the reflected color.—Mod Plastics, Dec, p72

PULLS BIG POLES

Hydraulic pole puller, combined with earthborer and extendable boom, is mounted on a four-wheel-drive truck. Pulling apparatus and earthborer are side by side at the rear of the truck. Boom rotates so it can support load over either one. Boom capacity is 7,500-lb. lift to height of 38¼ in. Pole puller develops up to 50,000-lb. pull by direct reaction on the ground. Unit is giving better efficiency and safety for Los Angeles Dept. of Water and Power.—Elec World, Dec 18, p100

Vanadium Vandalism in Furnace, Boiler Corrosion

Vanadium was accused, at the recent annual meeting of the American Society of Mechanical Engineers, as the actual corrosive agent in heavy-fuel-oil ash. High furnace temperatures make this a widespread problem; besides, the growth of the gas-turbine field causes this type of corrosion to assume greater importance.

For instance, the Hartford Electric Light Co. is having trouble with pitting and worm-tracking of furnace-wall tubes. Improved combustion conditions, reduction of flange impingement, lowered metal-surface temperatures, and use of higher-grade fuels slowed but did not halt corrosion.

Research is now going on in two directions: (1) fuel additives to inhibit the harmful constituents of the oil or to raise the melting point of the ash above a plastic state at operating-metal temperatures, and (2) protective coatings, such as a 25% chromium overlay on tubing.

General Electric Co. also is investigating this type of corrosion. Its experience shows that corrosion found on metals above 1000° F. and subject to No. 6 fuel-oil firing is associated with the presence of vanadium in the oil.—Oil & Gas J, Nov 30, p48

Shrinks Smoked Meats Less

More efficient meat smoking is reported from Evergreen Packing Co. Its new method is to use propane as a heating medium for a 50–50 mixture of maple and alder sawdusts.

Big advantage is that shrinkage from moisture losses can be controlled. Ham shrinkage is 25% less than when wood is used.

Smoke is created by shooting the propane flame under a metal sawdust table. Fans circulate the smoke and heated air through smoke rooms at 600 cfm. with a temperature drop of 10° F.

Air temperature is 150° F. for hams and 135° F. for bacon. Hams are smoked 8–10 hr., while bacon is smoked not over 9 hr.

From the smoke rooms, smoke and air are brought back to the ovens. More fresh air is drawn in to provide oxygen for gas and sawdust combustion.—Food Ind, Dec, p80

Dip Tank "Dips" Sheets

An unusual method of applying drawing compound to sheet steel before drawing is employed at the new Maytag Co. plant in Newton, Iowa. Sheets are stacked on edge in baskets and are carried through a cleaning and lubricating booth by overhead conveyor.

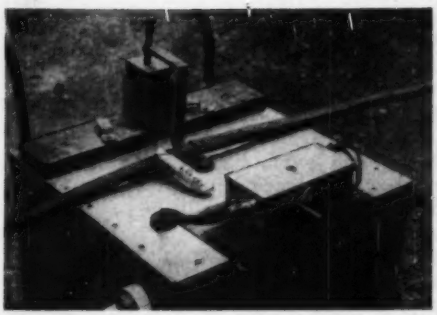
Cleaning and rinsing solutions are sprayed over the sheets, then the basket is carried over the drawing-compound tank. The conveyor stops for a brief period, and the compound tank is raised by a hydraulic ram to dip the sheets. Then as the tank is lowered, the conveyor starts its forward motion. Dip cycle can be closely controlled.—Ceramic Ind, Dec, p52

Compressed-Air Generator

Whirling-disk-type electric generator, built at Case Institute of Technology, is driven by compressed air and has no iron in its magnetic circuit. The disk is 5¾ in. in dia. and is made of beryllium copper. Compressed air blowing against "buckets" cut in the disk whirls it at 17,000 rpm.

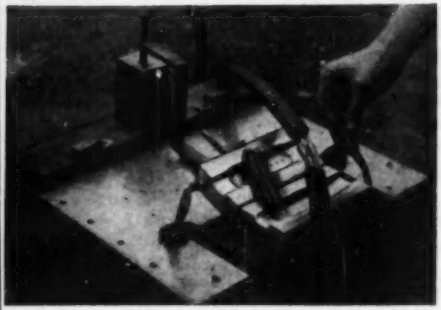
Coil "windings" are not wound, but cast of solid copper. Brushes are jets of liquid mercury. Flywheel energy is so great that solid metal brushes would not handle it without great loss.

Possible use is for the magnetic core of a betatron. Magnetic field developed is reported as 6,000 times as intense as that of the earth.—Elec World, Nov 20, p113



1 *AFTER CUTTING, two-conductor cable is ready for jacket removal, which is done with a replaceable-blade knife.*

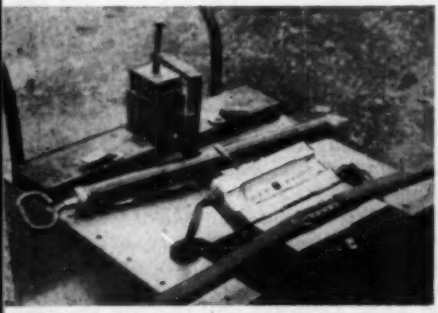
2 *WITH JACKET REMOVED, cable is placed in shop-made carbon mold for copper-thermit welding of both conductors.*



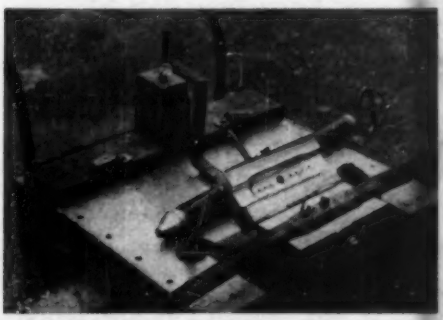
3 *PLASTIC SEPARATOR is placed over trimmed, welded conductors. Punched holes in separator improve bond with final jacket.*

Splice Cables On the Job

New cable repair cart plus a new cable-splicing method make possible on-the-job splicing of broken or worn electric cable. The spliced section possesses the same mechanical, electrical and dielectric properties as the original cable. Little training is required and labor costs are low. Spare cables are eliminated.—Coal Age, Jan, p70



4 *READY FOR VULCANIZING, the splice is placed in aluminum mold. Cable jacket, near splice, is clean and adhesive-coated.*



5 *HINGED MOLD, with internal heating units, is opened, excess plastic is trimmed off. Time consumed is 20 min.*

PRIVATE SHOWING TELEVISION

The operator of the scrap baler is the only spectator of a continuous television show at the General Motors Fisher Body Div.'s new Pittsburgh plant. TV receiver (white arrow and inset) shows him the scrap bales dropping into gondola car outside the building. When car is full, he can move full car and bring empty car into position by remote-controlled car puller.—Steel, Dec 4, p73

Mesh Traps Entrained Vapor

Entrained mist can easily be carried along in a chemical process. Keeping vapor velocity low avoids the mist problem, but output rate of processing equipment is then limited. So the logical answer is a means of separation.

Mats of knitted wire cloth have proved successful. They are inserted, for example, between trays on bubble-cap distillation or absorption columns and ahead of condensers or between evaporators in multiple-effect evaporation systems.

A mat of knitted wire cloth, 2¼-6 in. thick, will catch 98% of the entrained mist when placed between bubble trays. Pressure drop is usually less than ½ in. of water.

Mats are made by Metal Textile Corp. and Otto H. York Co.—Chem Ind, Nov, p719

Automatic Belgium Mill Combines Many Advantages

The Aluminum Co. of Canada's new Belgian rod mill at Arvida, Quebec, was selected because the tonnage involved, as well as the disadvantage of hot rolling aluminum under slight tension, did not warrant a continuous or semi continuous mill.

The new mill combines the advantages of the free looping mill with many of those of the continuous mill at a low initial investment. The mill, rolling from a 6x6x36-in. ingot to ⅜-in. rod in 22 passes, produces 100,000 lb. per 8-hr. shift.

The roughing mill is driven by a 900-hp., 720-rpm. motor. Two 22x64-in. three-high stands with five passes each and one 22x54-in. three-high stand with three passes form the roughing-mill train. The five intermediate mills and four finishing mills are 15½x24-in. three-high stands. Handling between passes is automatic.

As aluminum heats up during rolling, the conventional square down-repeaters are set 10 ft. from the mill to provide space for cooling the rolled rod. Oval turners placed immediately behind the delivery guides on the oval side are set at about 20°. The oval repeaters are set 12 ft. from the mill to allow the oval room to continue the twist 85° from the entrance to the repeater.—Iron Age, Nov 30, p72

Buried-Block Resistance Tells When to Irrigate Soil

Five Hawaiian sugar plantations are now determining when and how much to irrigate cane fields by using electrical instruments. This is an application of the Bouyoucos principle first formulated 15 years ago at Michigan State College.

Small plaster of paris blocks with wires running into them about an inch apart are buried in the ground. Five or six blocks may be enough for 70–80 acres where soil conditions are uniform.

Wires are run from each block to the edge of the field. At periodic intervals, resistance between wires in the block is measured with a Wheatstone bridge. If the field is wet, resistance is low. At the maximum amount of water that the soil can hold, resistance of the block is 600–800 ohms.

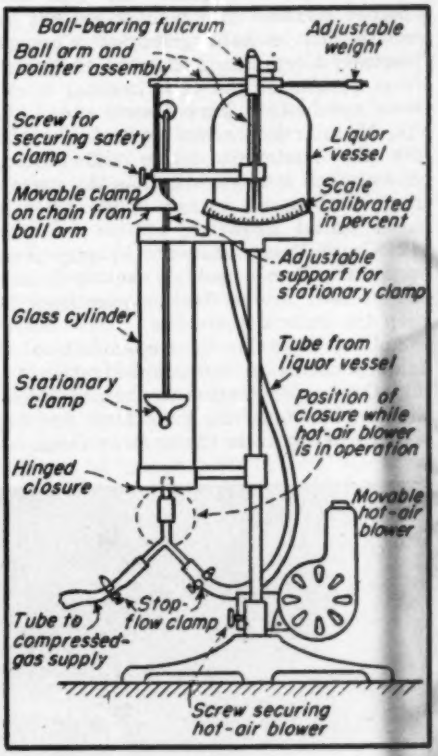
As the soil dries out, the resistance rises gradually to 1,500 ohms. and then sharply from there on—possibly to 2,500 ohms the next day and 40,000–50,000 ohms a day or so later. This is the "wilt point" at which fields must have irrigation. Tests during irrigation show when enough water has been added to the soil.—Elec West, Dec, p73

Inhibits Transformer Oil

Experimental study of di-tertiary-butyl-para-cresol (DBPC) has shown it to be superior to phenylalphanaphthylamine previously used by American Gas & Electric system as oxidation inhibitor for transformer oil. DBPC is unaffected by ultra-violet light, insoluble in water, and not removable from oil by fuller's earth. Oxidation products are soluble in the oil.

Field tests are now underway on reclaimed inhibited oils in transformers and oil circuit breakers. For transformer oils, 0.3% inhibitor by weight is specified; for circuit-breaker oils, specification is 0.05% by weight.

Pending further laboratory work, caution is being exercised in inhibiting new oils in new transformers. Present plans are to inhibit oils in only two new transformers and to place them under careful observations—Elec World, Nov 20, p134



TESTER GIVES SHRINK POTENTIAL

This small, inexpensive tester will determine shrink potential of rayon fabric. It consists of a Pyrex cylinder in which the test strip is held between two clamps. Lower clamp is stationary and the upper one is connected to a balance arm. Variable tension can be applied to the arm. A pointer is fixed to the arm near the fulcrum. The pointer operates over a scale calibrated in percent shrinkage or elongation. Bottom of the cylinder is closed by a hinged metal plate to permit filling with water. It may be opened to admit hot air from the attached blower.—Textile World, Jan, p123

Gray Iron and Nodular Iron Growth Characteristics

Unalloyed gray iron when heated to any temperature above a red heat changes permanently in volume. To find out whether nodular iron also is subject to growth led metallurgists at Cooper-Bessemer Corp. into a research program. From results of the experimental work, these conclusions were drawn:

1. Nodular iron, when cyclically heated into the austenitic range and cooled, shows much less growth than does gray iron. It becomes rather stable after a small initial growth.

2. Graphitizing elements in gray iron apparently do not prohibit growth if they are present in insufficient quantities to keep the matrix austenitic.

3. Growth is due to a combination of oxide penetration and graphitization.

4. Oxide penetration is helped when the graphite is in the flake form and resisted when it is in the nodular form.

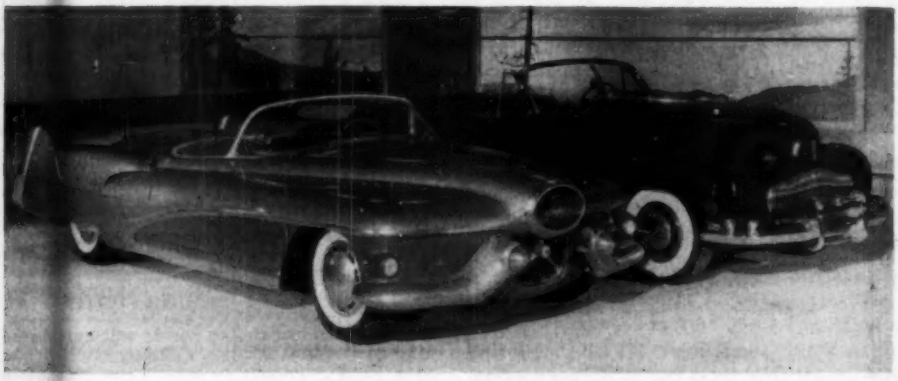
5. Cyclic heat treatment is harmful to the physical properties of gray iron unless the iron is stabilized with a carbide stabilizer. The same heat treatment increases the tensile strength of nodular iron but lowers its ductility.—Foundry, Dec, p96

Put Viscometer on Slasher

Sizing-solution viscosity is a measure of the size pickup in the warp and also provides an indication of the size-solution quality.

Viscometers have been perfected for use on slashers for process control. They eliminate the necessity of removing samples for laboratory tests; thus, accurate control of viscosity can be maintained under actual operating conditions.

In practice, viscometer readings are compared with a predetermined value. Any radical change in the viscosity warns the operator to stop the process before the warp is improperly sized.—Textile World, Jan, p126



THE CAR OF TOMORROW

General Motor's Le Sabre latest experimental car (left) is shown with the 1938 exeprimental car. Under Le Sabre's spectacular body are many mechanical innovations not yet seen in today's cars. Aluminum and magnesium engine is V-8 type with 10 to 1 compression and supercharger. Dual fuels are used—premium gasoline with methyl alcohol injected at certain speeds for extra power—upward of 300 hp. Torque converter is mounted near differential. Universals are in rear axles, not in drive shaft. Differential is rigidly fixed to frame. Rear brakes are mounted outside of differential, not on the wheels. All wheels have independent suspension.—Am Auto, March, p40

Radioisotopes in Power Plants

Measuring flyash collector efficiency, locating manhole covers under the snow, studying circuit-breaker operation are a few things tracers can do

RADIOACTIVE TRACERS can be employed to advantage in many technical problems confronting electric utilities. Both laboratory and field applications will extend their usefulness to the industry. The following applications have already been established successfully or are considered practical:

1 Water penetration into various electrical insulators, water-proofing materials, cement, and similar substances can be determined by using water that contains tritium. Special Geiger-Mueller counter tubes are needed to detect tritium.

2 Mechanism of electrical conductivity in transformer and cable oils can be studied by using an oil-soluble organic acid (containing carbon-14 isotope) of a type present in deteriorated oils of relatively high conductivity. Adsorption of acid, sludge formation, and cataphoresis, which is the movement of suspended particles through the oil under an applied voltage, can be studied in insulating oils.

3 Accelerated corrosion tests can be carried out by adding tracers to metals when they are made. Then even minute quantities of such metals can be detected in the solution in contact with the metal.

4 In the study of circuit-breaker operation, the transfer of material from one component of the breaker to another can be detected by tracers. Similar studies have been carried out on problems involving friction.

5 Slagging of boiler tubes is being studied by tracers. The origin of iron, silicon, sodium, and other elements in the deposit can be found by tagging atoms at their suspected source and later trying to identify them in the deposit.

6 Leaks in closed pipes and vessels can be located by introducing into the pipe a radioactive gas (carbon monoxide with carbon-14) and attempting to detect its presence outside. An important application is testing pipe-type, underground, gas-pressure, high-voltage cables. Others are detection of leaks in steam pipes, hydrogen-cooled generators, and steam condensers.

In condensers, the tracer would be added to the circulating water and detected in the condensate. As contamination of the ground and water cannot be completely avoided in such tests, the amount of tracer must be small or tracers used must have short half-lifes, such as sodium-24 with a half-life of only 14.8 hr.

7 Tracers could be added to fly ash to evaluate precipitator efficiency or to locate where the ash not collected preferentially settles. Short-lived isotopes would have to be used.

8 Location of underground pipes or manhole covers blanketed by snow could be determined by embedding minute quantities of radium or the like safely in the metal and detecting with a counter tube.

9 Migration of insulating oil in cables and potheads can be studied by adding tracers to the oil. Radiation intensity must be kept low so no deterioration of the oil takes place. There appears to be no danger of the ionizing voltage of the equipment being lowered by the tracer.—Elec World Dec 18 p92

Textralizing Process Imparts Permanent Crimp to Fibers

Equipment that can alter certain characteristics of fibers by the addition of crimp has been developed by Alexander Smith & Sons Carpet Co. Called Textralizing, the process is characterized by an angular crimp in the material.

Two mechanical changes take place in the product. The first is the increased bulking capacity of the fibers. Warmer clothing and improved carpet coverage and appearance may result from this factor. The second is increased energy-absorption capacity. Crimping a fiber forms it into a series of flat springs. Tests show greater wear resistance.

The crimp is produced in the fibers by feeding them lengthwise between feed rolls into a chamber filled with previously crimped material. The fibers buckle when forced against this mass, which is maintained under pressure by weighted doors at the chamber exit.

Frequency of the crimps produced depends on the pressure of the doors and interior friction, and the number, size, and stiffness of the entering fibers. Crimps as fine as thirty to the inch have been produced in a sliver averaging ½ oz. per yd. in weight.

Just below the entering feed rolls, the chamber is provided with radial holes through which the setting agent enters the mass of crimped fibers to produce a permanent set.

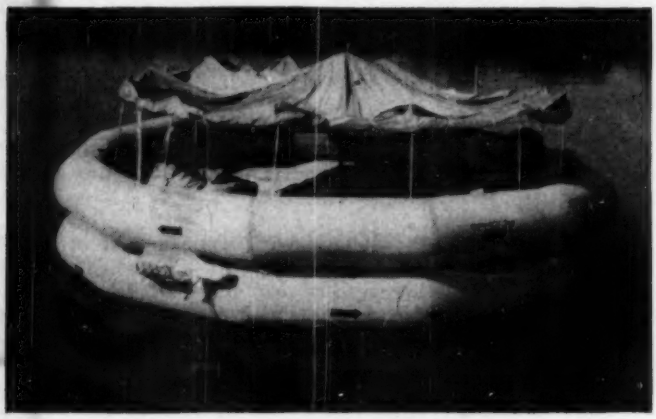
The setting agent is water under pressures up to 20 psi. and at temperatures up to 255° F. Fibers are kept in the chamber usually 30 sec. to 2 min., depending on the type of fiber and its condition.—Textile World, Dec, p106

Measures Gas Pressure

New, unique method measures pressure electrically. Two advantages of the system is that it has no intricate mechanical linkages and all moving parts are sealed in a chamber filled with argon.

The chamber has one wall made up of a flexible diaphragm that moves inward when outside pressure exceeds the pressure of the gas inside the chamber. Electrical contacts then close a heater circuit. The heat expands the argon gas until its pressure equals the outside pressure. The heater turns off, and the temperature is held at that point.

Gas temperature is measured by means of a thermistor placed inside the chamber. Pressure of the gas is determined from a calibration chart.—Electronics, Jan, p190



TENTATIVE HOME

This U. S. Air Force floating tent is designed to carry 20 men or support 5,000 lb. It can be inflated in 1 min. The entire raft can be rolled up into an easy-to-handle 18x 36-in. bundle. — Aviation Wk, Nov 27, p15

Lessons from Heavy Storms Teach Line Construction

Power lines cannot be built that will stand up under severe ice loadings. That is the conclusion reached by engineers of a Washington State utility, the Clark County Public Utility District. But they have learned how to keep such damage at a minimum. Here are the important rules they follow:

Poles—Do not stub corner, angle or transformer poles. Keep these key poles in perfect condition.

Guying—The ratio H/L on down guys should never exceed the value 2:1.

Conductors—Pay close attention to correct sagging of conductors during line construction; do not string wire of smaller sizes too tight. Use compression-type splicing sleeves whenever possible; confine use of automatic splicing sleeves to hot-line work. Do not make slack spans over 80 ft. long; remember that 2 in. of radial thickness of ice on No. 6 HDBC results in 1,000-lb. tension per conductor on a 300-ft. span.

Service Drops—Install intermediate service poles on all services over 120 ft. long. Select the house support to avoid house knobs pulling loose from heavy ice loading. Guy all heavy and long services.

Trees—Remove or top all danger trees and trim all overhanging limbs because falling trees and branches do the most damage to wires.—Elec West, Nov, p66

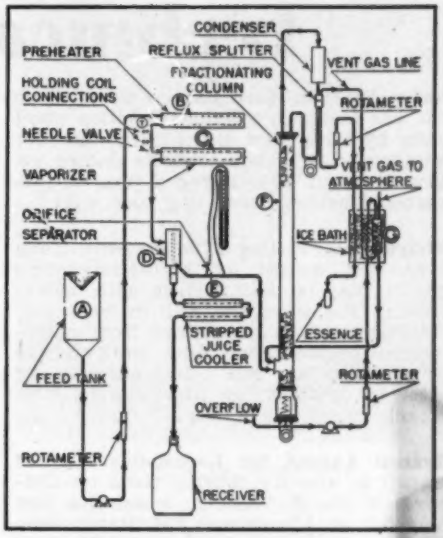
Steam Nozzle Aids Chip Flow

A uniform flow of wood chips from storage bin to digester in making paper pulp is needed to establish homogeneous chip dispersion within the digester. An efficient means to get uniform flow from an overhead bin is with a rotary steam nozzle inserted at the mouth of the bin.

Action of the steam is to propel chips in the direction of the path of the steam and dislodge other chips in the bin. So a stationary nozzle is effective only in a limited area.

If the nozzle is directed upward at an angle depending on the sloping sides of the bin and is free to rotate around the vertical axis, then the effective area is greatly increased. The nozzle can readily be rotated by chain-and-sprocket drive operated from a hand crank.

Seven years' operation at the Puget Sound Pulp & Timber Co. has proved the chip-freeing value of the rotating nozzle as well as its prevention of chip-bin fires. —Paper Ind, Nov, p860



CONCENTRATES GRAPE JUICE

New process, developed at U. S. Dept. of Agriculture's Eastern Regional Research Laboratory, concentrates grape juice in one pass. Reconstituted juice equals starting juice in flavor and aroma. Pasteurized juice at 15.5 Brix from feed tank A is preheated in B to 210° F. and vaporized in C. Juice is stripped from vapor in separator D and cooled in coil E. Vapor is concentrated in Column F. Vent gases are scrubbed in ice bath. Essence is accumulated and added to stripped juice. Sugar is added, and juice is canned and frozen.—Food Ind, Dec, p60

Technical Shorts

Safer Soybean Processing—Central Soya Co. has made its solvent extraction plant safer by using inert gas to purge lines for shutdowns and when tower is started up. Gas is about 80% nitrogen plus 15-18% carbon dioxide.—Chem Eng, Dec, p184

Molybdenum Plating—The answer to using lower-cost metals for high-temperature service may be plating them with molybdenum. The technique, still in laboratory stage, plates the molybdenum from molybdenum pentachloride onto work heated by an induction coil. Best adhesion on steel is obtained by first plating with nickel.—Steel, Jan 8, p62

Transit Layout for Locomotive—Use of transit in aligning moving parts on Chicago & North Western locomotive has helped it go 4 years and 360,000 mi. without a major overhaul.—Railway Age, Dec 30, p28

Plastic Windows for Cars—Pittsburgh Plate Glass Co.'s new plastic CR-39 may be used for heavy-duty automotive glazing. The plastic costs more but lasts 10 times as long as safety glass.—Mod Plastics, Dec, p63

Reduce Industrial Pollution—The General Motors Corp. Buick plant is substituting shot-blasting equipment for sulphuric acid for cleaning forgings. Elimination of the acid reduces stream pollution.—Eng-News Rec, Dec 7, p12

Clamp Cable to Feeder—Small, insulated track signal cable is clamped to the top of a 275-v. bare feeder at an Inland Steel Co. coal mine. Better protection of the signal cable results, and this support method saves money.—Coal Age, Jan, p97

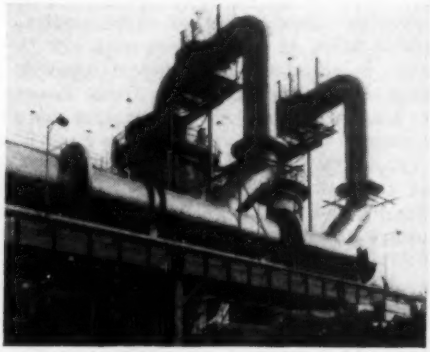
Midget Iron Maker—Small cupola, operated in engineering department of U. S. Graphite Co., has 7-in. ID shell, 4½-in. ID lining, total height of 30 in., and ¾-in. tap hole. It operates with 5-oz. blast pressure. Typical charge is 2½ lb. iron, 5 oz. coke, and 1 oz. limestone.—Foundry, Jan, p146

Cableway Facilitates Repairs—A permanent cableway and cofferdam setup is installed at Shasta Dam. It is ready to make repairs quickly and inexpensively if erosion should damage the spillway apron. —Const Meth & Equip, Jan, p51

Detect Pinholes in Paper—A quick test for detecting holes in the coating of coated paper is to wipe a red-dyed turpentine or thin oil over the coating. Red stains on the paper side will show the defective areas.—Mod Packaging, Nov, p128

Causes Poor Spinning Quality—Setting cotton gins too close in an effort to get all the lint possible off the seeds nicks the seeds. Resulting mote particles will injure the spinning quality of the cotton.—Textile World, Jan, p119

Liquid Blast Cleaning—Pangborn Corp. employs a high-velocity stream of nonmetallic abrasive particles suspended in an aqueous solution to clean and finish new dies.—Auto Ind, Jan 15, p46



SMOKELESS SMOKE STACKS

Air pollution is being successfully battled at the McKeesport plant of National Tube Co. Gas washers and companion electrostatic precipitators purify blast-furnace gases that fire five boilers. Dust content is reduced to 0.01 g. per cu. ft. Another advantage: about 100 tons of iron ore will be recovered every 24 hr.—Iron Age, Nov 30, p91

Major Defrosting Job—When a cold spell froze loads in hundreds of iron ore cars at Lake Superior, railroads thawed them out with steam from locomotives spotted in the yards. Each engine was hooked up to 20 or 25 cars through flexible hose connections laid on the ground.—Railway Age, Jan 8, p52

Joint Enterprise—Four Italian firms are joining their production skills to build the English de Havilland Vampire and Venom fighters. Fiat and Alfa Romeo are building the engine, while Fiat, Macchi, and Ambrosini will build the Venom airframes.—Mach, Jan 6, p29

Air Dries Food—New food-drying technique under development uses no heat. Air at room temperature is recirculated over the food and through a dessicant. Capacity of air to pick up moisture is obtained by drying it, rather than by heating it.—Food Ind, Jan, p7

Speeds Materials Handling — Two-way radio speeds materials handling at Johnson & Johnson Co.'s shipping center. Dispatcher at master station checks his warehouse layouts and stock-locator cards, then radios directions for stock movements to radio-equipped fork lift trucks.—Business Wk, Dec 16, p64

Powder Cutting—Stainless steel, brass, bronze, cast iron, and copper can be cut with a powder-cutting blowpipe. Ignition of iron powder fed into the flame of an oxy-acetylene blowpipe provides the extra heat needed to cut these metals.—Marine Eng, Jan, p66

Oil Runs Hot—New wildcat oil well in Texas is producing a crude oil that has a pour point of 82° F. To keep the oil from congealing, its 2-in. flow line is jacketed in a 4-in. pipe through which hot water is circulated. Magnesia insulation covers the large pipe.—Oil & Gas J, Jan 4, p27

Higher Fatigue Strength—Shot peening magnesium castings improves their fatigue strength. Peening with conventional shot destroys surface but with 3/16-in. shot gives about ten times the fatigue life of unworked castings.—Am Mach, Dec 25, p131

TIMBER ARCH BRIDGE

The arch for this bridge is made of structural timber throughout. Notice the arch sway bracing. Even the lattice bars are made of wood. Bridge was built near Cubatao, Brazil. The clear span is 256 ft; deck load will be 810 lb. per lin. ft. Contractors for the job erected the arch in 60 days.—Const Meth & Equip, Dec, p81

Supermarket Lighting—A large California supermarket has general lighting controlled by low-voltage system. Installation's 17 miles of low-voltage control wire makes it largest of its type. System has 10 master control contactors of 23 stations each to control all lighting circuits for 53,000-sq. ft. area.—Elec West, Dec, p80

Cold Galvanizing—Iron and steel parts can be given a protective coating by spraying, brushing, or dipping the complete assembly with special zinc-rich material. Result is a thicker-than-average film that resists creep of rusted areas.—Prod Eng, Jan, p7

Trackless Mining of Iron Ore—Lower costs, higher productivity in underground mining of heavy, abrasive iron ore are being achieved by means of trackless mining methods and equipment. Machines, in use at Tennessee Coal, Iron & Railroad Co., are similar to those used in bituminous coal mining.—Eng & Min J, Jan, p58

How To Fabricate Glass Yarns

Almost any mill with modern equipment for processing fine-filament yarns can fabricate glass yarns. Here are some tips on how it is done

HANDLING GLASS YARNS for warping, quilling, and weaving requires keeping in mind these points:

1. Glass yarn is similar in handling to other fine filament yarns; it requires up-to-date equipment for best results.

2. Non-stretch characteristic makes it important to produce warps with uniform tension. No equalizing stretch is left in the yarn once it is in the loom.

3. A smooth finish on surfaces of guides, rods, heddles, and reeds is necessary to avoid abrading the yarn.

4. Clean equipment is required to produce stain-free yardage.

Warping — The modern horizontal warper and creel with whorl or disk-type tension is particularly suited for warping glass yarns for decorative or industrial fabrics. Warping is done with 400 to 600 ends per section or band, at a speed of 200–250 ypm.

Risers or elevators should be accurately set according to the size of yarn used. Sections or bands must be joined accurately. When beaming down from the mill, it is important to avoid build-up at the beam flanges. Sufficient tension must be applied to obtain a solid beam.

Weaving—Looms developed for weaving rayon and other filament yarns are recommended for weaving continuous-filament glass yarn. The take-up roll should be covered with rubber or cork to prevent slipping of the cloth.

For weaving glass leno fabrics, it is recommended to use the inverted top and bottom doup steel heddles. It is also preferable to use a finer reed and skip a dent to reduce air space and possible reed marks. The whip roll should be mounted on springs.

Full front center is recommended for harness time, with as little power as possible on the pick motion.

A smooth surface covering of the race plate is best. Felt is recommended for continuous yarns, and metal for staple or combination yarns.

Packaging—Glass fabrics are wound on a paper spiral tube having a 2-in. inside dia. and a ¾-in. wall thickness. Finished roll size should be governed by the weight per yard of the material. The

Why Glass Yarns Behave as They Do

The basic continuous glass filament has a diameter of about 0.00025 in. Compared with filament rayon, this is about ½ den. on a yards-per-pound basis. On a diameter comparison, it is ¼ den.

A "binder", or size, is applied during forming to bind the filaments together and protect the base glass during subsequent operations. The filaments are actually extremely fine and highly flexible glass rods, and do not possess any stretch in textile manufacturing. Since glass yarns will not absorb moisture, they cannot be "twist-set".

Two or three turns per inch in the single yarn make glass yarn too lively for efficient handling in warping and weaving. Two twisting operations are necessary for balancing. A slightly high twist in the first operation, using "Z" twist, and plying with "S" twist provide balancing.

The yarn is built up to the desired size by twisting and plying a minimum of two strands with the desired turns per inch according to end use of the fabric to be produced.

weight of any one roll should not exceed 90 lb. About 125 yd. of heavy fabrics and up to 500 yd. of light fabrics can be placed on this roll.

For protection during shipping and storage, the wrapped rolls should be packed in wooden cases or durable corrugated cartons.—Textile World, Jan, p110

Camera Frames Flight Data

A camera developed by Douglas Aircraft Co. records data on airplane takeoffs and landings. This data is employed in projecting the safe loads an airplane can carry, length of runway required, best propeller pitch and flap angle under various conditions, and the power output needed.

A semi-circular glass grid is located between the camera lens and film. It is locked into fixed position once the camera has been carefully spotted for a test.

Horizontal lines engraved on the glass represent 2° each; vertical lines 1°. Limit of the camera tracking range is 160°. Pictures are taken at 1/10-sec. intervals.

A 6-in. lens, at the center of rotation of the camera, transmits the image-forming light partially masked by the grid.

Angular data recorded on the film are converted mathematically to linear and vertical airplane travel. Distance figures plotted against time present a graphic story of performance during any type of low-level test.—Aviation Wk, Jan 1, p25

Conveyor Dispatches Work

One-man conveyor, at Cushman Motor Works, keeps 165 machine-tool operators supplied with work. A double-decked conveyor system makes this possible.

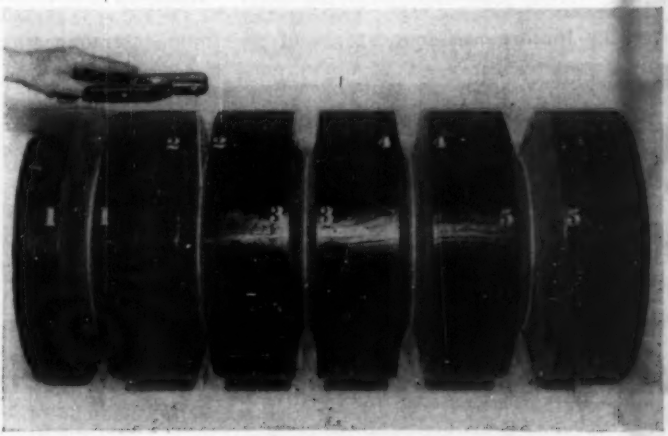
Trunk of the system is a power-driven endless belt conveyor. The top level carries work to machine tools grouped according to work. The lower flight returns completed work. Eight gravity roller spurs from the belt conveyor feed work to the machines.

The eight roller conveyors are controlled from a centralized control panel. Levers actuate rakeoffs that deflect work down the roller conveyors.

The dispatcher works from a board containing routing sheets. These sheets describe all operations performed on the part in chronological order. By referring to the routing sheet, the dispatcher learns which machine group gets a certain part and what operations must be performed on it.—Factory, Dec, p72

WELDING MOCKUP

This wooden mockup was made by Commonwealth Edison Co. to study proposed grooves for high-pressure piping of 3⅜-in. wall thickness and 14-in. dia. Selected groove has chrome-plated backup ring. Ring and pipe ends have 5° taper. Groove has 3/16-in. root gap, and pipe terminates in 1/16-in. wall at root gap. Cutback changes from 20° to 10° at 1¾ in. from inner wall.—Weld Eng, Dec, p34



Magnesium Aircraft Parts Hot-Formed Successfully

Hot forming of magnesium aircraft parts is practical if proper heating equipment is available. That was proved by Douglas Aircraft engineers in tests with both drop hammers and stretch presses on magnesium alloy FS-1.

The sheet was heated on an aluminum slab that had been heated to 650° F. by gas-air torches. The sheet was placed flat on the slab, covered with asbestos sheet, and weighted with lead pigs to hold it in firm contact with the slab.

The Kirksite bottom dies were heated by torches to under 475° F. (Kirksite softens at higher temperatures.) The lead top dies were used just after pouring and solidifying to get them as hot as possible.

Results on drop-hammer tests indicated that variance in die temperatures meant little because of the short contact time between sheet and dies. Also, parts that in aluminum required staging operations could be formed in a single hit of heated magnesium.

Springback was small, but wrinkles formed in the lighter gages and made planishing necessary. Parts had to be heated for planishing.

In the stretch-press tests, heating the sheet by torches was found to be of no value. Heated dies supplied all the heat needed for forming. To obtain uniform deformation in the sheet, a longer skirt had to be added to the die so the sheet skirt would be heated during stretching.—Steel, Nov 27, p56

Increases Precision

Machine vibrations were giving plenty of trouble on machine tools at Reeves Instrument Co. until it put in vibration dampeners. A ridged rubber-and-wood-block assembly, about 2 in. thick, was cut to the area recommended for each machine's weight. The dampeners were set on the floor with leveling blocks on top, and the machines bolted to the leveling blocks at all four corners. The installation was made under all machines that are apt to cause vibration—grinders, lathes, millers, and gear cutters. Vibration has been reduced so much that the top of a height gage shows no perceptible motion.—Factory, Dec, p84

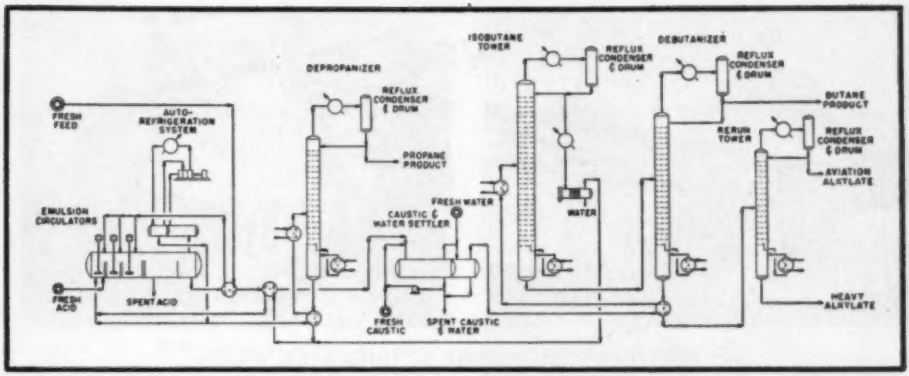
European Power Revival

Power is still short in Europe, but OEEC is pushing a program to boost power output by 7–8% in 2 yr. An international electric authority may be needed to get necessary cooperation.

OEEC sees three objectives: (1) maximum interconnection across borders, (2)

GLASS BAFFLE BALKS AIR

Eliminating turbulence by bell-shaped glass baffle reduces air gain of beer during tank filling by 50% and lessens foaming. Beer quality is thereby improved. Beer is here entering tank at 4,400 gph. Directing the beer upward into baffle reverses flow and reduces velocity by 80%. —Food Ind, Jan, p52



***HIGHER-OCTANE RACE** requiring alkylate for blending to gasoline put this Kellogg process into two new U. S. units. But the changing international situation will mean that the . . .*

system established for financing international power exchanges, and (3) expansion of existing hydroelectric plants.

Increasing the efficiency of power interconnections is held crucial to Western Europe's power system as a whole. Interconnection will greatly increase total energy output and do it at less cost than any other method.

For example, water surpluses in hydroelectric systems may not be drawn on within the local power networks. Last year France let water spill over its reservoirs, yet neighboring countries had power shortages. An interconnection would have cured those shortages.—Power, Jan, p138

Self-Aligning Bearing

Engineers at A. V. Roe Canada Ltd. have developed a thrust bearing that automatically adjusts itself to minor misalignments. The unit is constructed to float in a plastic ring. Any slight misalignment of the shaft is accommodated by a deformation of the plastic ring, while the relative incompressibility of the material maintains the required resistance to thrust loading.—Aviation Wk, Jan 1, p25

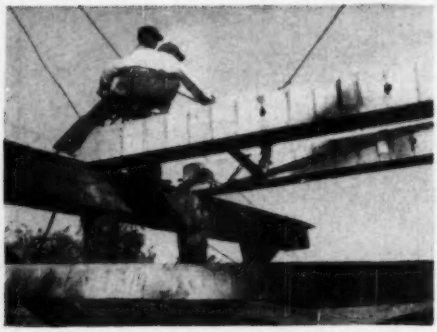
Improved Alkylation Process Will Help Avgas Production

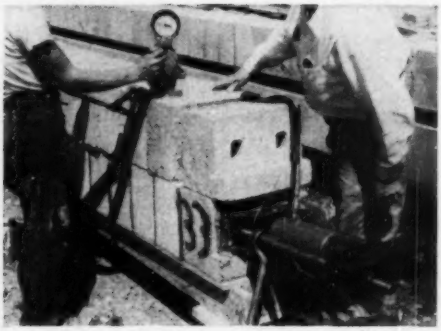
Improvements in the sulfuric acid alkylation process have been announced by M. W. Kellogg Co. (see bulletin 3–2, p 57). This news is of particular importance now that increased need for aviation gasoline indicates a strong revival of alkylation operations.

Innovations in the process include a redesigned reactor vessel (left). It provides three reaction zone and a hydrocarbon acid settling section. Fresh sulfuric acid admitted to the first reaction zone proceeds by cascade flow to the second and third and is withdrawn as spent catalyst.

The three zones permit maintaining a high isobutane-olefin ratio. This is done by recycling isobutane from the isobutane tower to the fractionation section of the alkylation unit.

The total stream is admitted to the first zone. Intimate contact with fresh acid promotes rapid reaction between isobutane and olefin. Also, contacting fresh acid with split hydrocarbon feed in three successive zones maintains a higher over-all acid concentration.—Oil & Gas J, Dec 28, p78





BRIDGE BUILT OF BLOCKS STRUNG LIKE BEADS

A highway bridge in Tennessee was built by stringing standard, machine-made, hollow concrete blocks on cables. When the cables were tensioned, the blocks were converted into beams rigid enough to sustain heavy truck loads. Beams are prefabricated in a shop. Prestressing strands are composed of 7 wires each. A fitting is attached to each end and a threaded stud is inserted in the fitting. Turning a nut on this stud permits adjustments to be made in tension. Buttered with mortar on one side, successive blocks were strung on the strands. Concrete blocks are shown (right) being prestressed with a hydraulic jack. Picture on left shows beams in place.—Eng-News Rec, Jan 18, p39

Keeping Operator Supplied Jumps Machine Time by 60%

To run machines more of each working day is a problem for practically all metal working plants. Crompton & Knowles Loom Works tackled this problem and jumped the running time from 55 to 88% in the general machining section. This department is operated on these ideas:

- Everything is supplied to the operator. He does not have to leave his machine, except for personal reasons.
- The department contains a sufficient variety of machines so 90% of the work entering the department can be machined completely.
- Adequate space is provided for mechanized handling and for keeping a job ahead of each machine.
- Operators are paid an incentive wage. Working conditions are good.

To organize such a department requires that it be kept small enough to be covered properly by one general foreman. So the general machining department is limited to 86 machines and 132 operators working on a multi-shift basis.

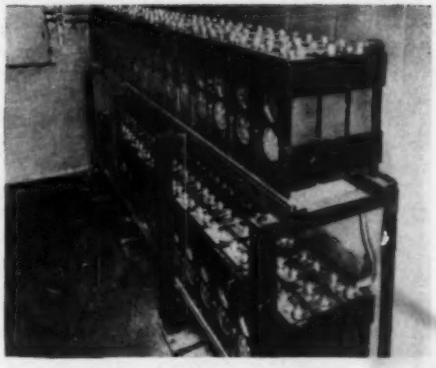
Working with the general foreman are 10 sub-foremen, 2 methods engineers, 17 clerks, 7 inspectors, 14 truckers, 17 runners and tool-crib attendants, and 3 setup men. This organization produces as many as 2,400 orders per month, with 9,600 operations required and each machine set up several times a day.—Am Mach, Nov 27, p93

New in Roof Bolting

A few coal companies are experimenting with three unusual roof-bolting techniques: (1) Wooden pins 2 in. in diameter with slots at both ends. A wedge at one end is driven against the bottom of the hole, and a wedge at the other end clinches the roof surface. (2) Grouting holes with cement to replace pins. This cements crevices together and prevents initial rock alteration and slough. (3) Grouting steel pins in place to increase bond between steel and rock.—Eng & Min J, Dec, p105

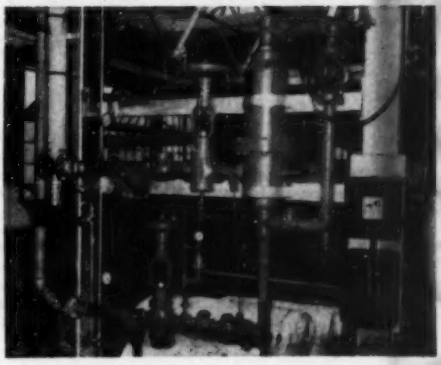
This Month's How To . . .

. . . operate unattended substation is illustrated by Philadelphia Electric Co. at its Manayunk substation. Needed was a unit with long life and reliable performance with little attention. So a 95-cell, nickel-cadmium alkaline battery, made by Nickel Cadmium Battery Corp., was chosen to supply 125-v., 2-wire service to remote-controlled circuit breakers, emergency lights, and supervisory control service. Installation needs one voltage reading a month, a specific-gravity test every 6 mo., electrolytic level check every 3 mo., and cleaning once a year.—Elec World, Jan 1, p72



. . . tow half a million pounds is shown by an electric-propelled tractor made by Automatic Transportation Co. The tractor measures 10 ft. long and 64 in. wide, and weighs about 6 tons. Unloaded speed is 21 mph. Features are four-wheel drive and four-wheel steer. The tractor has dual controls, with the two seats facing one another. This permits the driver to change seats and ride facing forward when traveling in either direction. Ultimate drawbar pull is claimed to be 10,000 lb. enabling it to pull as much as 3-million lb. on rails.—Auto Ind, Jan 15, p23

. . . cut dyehouse water-heating time with an instantaneous water heater was tried by Guyan Mills, Inc. Time lost in heating each batch prevented the dyehouse from keeping pace with the subsequent drying process on regular working hours. Installation of the water heater solved the problem. The heater is able to heat 100 gpm. to 180° F.—more than sufficient for dyehouse requirements. Steam is injected directly into cold water. Thus entire heat of the steam is transferred to the water. No storage tanks are needed. Cold water flows in, and hot water flows out.—Textile World, Jan, p130



Dynel Is Off to Good Start with Orders Ahead of Output

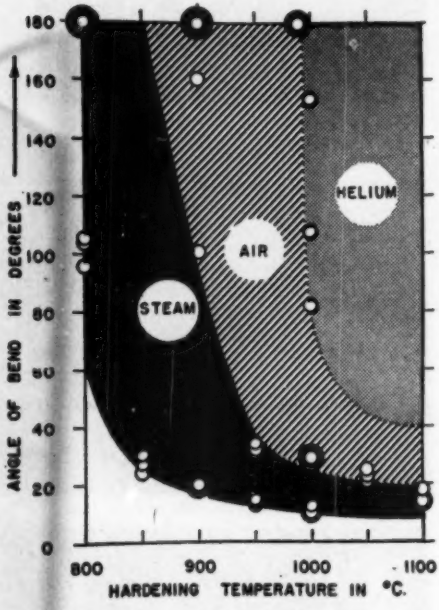
Dynel, the new synthetic fiber made by Union Carbide & Carbon Corp., is gaining excellent acceptance. Orders already are running ahead of the current annual output of 2-million lb. So within 6 months, capacity will be raised to a level of from 4- to 5-million lb. per year.

Dynel, which is a form of Vinyon N, is made from acrylonitrile and vinyl chloride (McG-H Digest, June '48, p20; Nov '50, p42). It is polymerized from a mixture of monomers that contains 60% vinyl chloride and 40% acrylonitrile.

The resin is converted into staple in a continuous process. The resin powder is mixed with acetone, filtered and extruded through spinnerettes into a water bath. Tow is collected, dried, stretched, cut into staple length, crimped, stabilized, and opened.

Properties of dynel make it a competitor of wool. It has the texture and warmth of wool, is non-flammable, washable, almost shrinkproof, and withstands mildew, fungi, moths, and other insects

Among chemical-industry applications will be filter cloths, acid-resistant work clothes, dust-fume bags.—Chem Eng, Jan, p186



STEEL EMBRITTLEMENT

Water vapor in heat-treating furnace atmosphere causes hydrogen embrittlement in steel. In dried helium atmosphere, bendability values for ¼-in. bars of type 414 stainless steel show full 180° bend up to 1000° C., then drop to 40-50°. In ordinary air atmosphere, embrittlement is indicated as low as 900° C. With steam admitted to furnace, specimens failed over entire hardening range down to 800° C. At 1000° C., metal was virtually glasslike, failing at about 10° bend. —Iron Age, Dec 28, p60

Fabricating Demonstrator

Methods of fabricating acrylic sheet can be graphically shown on a small demonstration unit designed by Plastic Div., Imperial Chemical Industries, Ltd., Eng.

The equipment consists of an oven with infrared lamps and a table. Two clamping rings are mounted on the table. One is for demonstrating the forming of heated acrylic sheet by blowing. The other shows how deep pressing is done. Electrical power for heating is all that is required, since a tire pump supplies compressed air and an automobile jack provides the thrust for press forming.—Mod Plastics, Dec, p143

Rotor Turns on Air Bearing

Engineers at North American Aviation, Inc., were looking for the nearest thing to a friction-less bearing they could find. And they came up with a film of air 0.001–0.002 in. thick. The thin layer of air acts as the lubricant between the rotor and its bearing. Thus, the only friction resulting is the viscous friction of the air.—Aviation Wk, Dec 4, p28

Wheeled Conveyor Permits Fast Mining in Low Coal

Gathering conveyors at Inland Steel Co. coal mines are mounted on track wheels. Thus equipped, a conveyor can be moved to the next loading point in a few minutes between shifts and transported to another panel almost as easily as pulling a string of mine cars.

Mobile conveyors work where the coal is thin and the roof is bad. A triple-heading entry is driven, taking top in two of the headings. Both are equipped with track and a circle-haulage point opposite every sixth room; that is, every 270 ft.

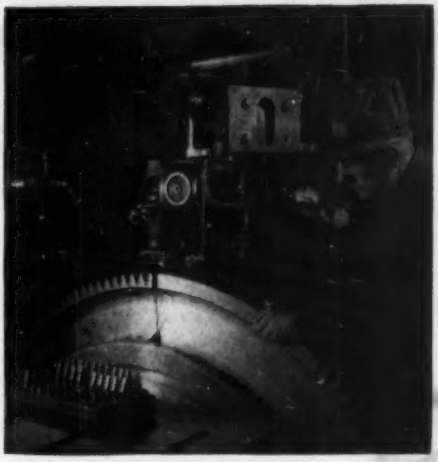
Mining of the panel is on the retreat. Shuttle cars dump directly—at right angles—into the wheel-mounted gathering conveyor. The conveyor serves 12 rooms, 6 on each side. After the 12 rooms have been completed and the next two on each side started, the conveyor is pulled 270 ft. to the next car-loading point. The actual move requires less than 25 min.—Coal Age, Jan, p58

New Market for Steel Wire

The field of prestressed concrete construction as a possible new market for high-carbon steel wire was emphasized at the recent annual meeting of the Wire Association.

In concrete construction, the high-carbon wire is stretched to a predetermined initial stress and then covered with concrete. After the concrete hardens, the wires are released. They then shorten and set up compression in the concrete.

Similar results can be obtained by poststressing. A concrete beam is poured with a longitudinal hole near its lower fiber. After the concrete sets, wires are inserted into the hole, stretched a predetermined amount, and anchored at the ends. The concrete is thereby brought under compression. The hole is then filled with grout.—Steel, Nov 20, p108



CUTTING WEDGE-SHAPED SLOTS

Spindles for Allis-Chalmers steam turbines are machined with circumferential grooves to lock blade roots in place. Axial slots through two or more disk sections are of multiple-wedge shape. Machining is done on a large planer fitted with special milling and broaching heads on the cross rail. Planer table is not moved during cutting. Instead, the milling and broaching heads are moved along the slot. A series of cutters and broachers are needed to rough and finish the slots. —Am Mach, Dec 25, p 85

Removes Carbon Monoxide

Installed like any standard exhaust, the catalytic exhaust renders gasoline-engine exhaust gas non-poisonous and odorless. Developed by Eugene Houdry, it is marketed by Oxy-Catalyst Mfg. Co., Inc. Action of the catalyst plus sucked-in fresh air transforms the exhaust gases into harmless vapors.

The catalytic exhaust imposes no more back pressure than the standard muffler. Weight and space requirements are about the same as for a conventional muffler. The OCM exhaust operates only on unleaded gasoline. Biggest application so far seems to be in gasoline-powered lift trucks.—Auto Ind, Jan 1, p56

New Products

Oscillograph Tube—Model 7JP1 is a 7-in. c-r. tube with electrostatic focus and deflection and designed to give exceptional brightness when operated with anode-No. 2 voltage near 6,000 v. Electron gun has a grid No. 2 operated at anode-No. 2 potential.—**Radio Corp. of America**—Electronics, Jan, p215

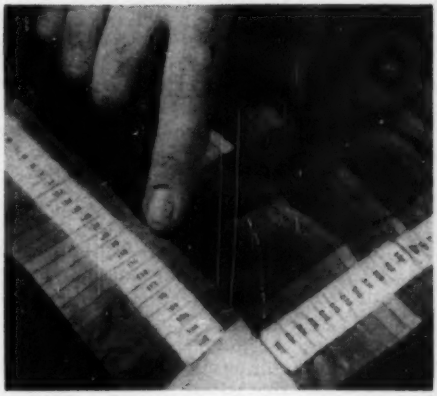
Checks Hobs—New instrument tests hobs and cutters for radialism, flute-to-flute spacing, total spacing, face offset, accuracy of straight flutes, and face and OD runout. It is designed to utilize standard index plates of the company's No. 10-12 hob-sharpening machine.—**Barber-Colman Co.**—Am Mach, Nov 27, p149

Concrete Spreader—Combined oscillating screed and screw spreader on this machine provides the triple function of spreading, initial strike-off, and precision metering of concrete for the following finisher.—**Jaeger Machine Co.**—Const Meth & Equip, Jan, p104

Checks Stretch and Shrinkage—Recording speed-ratio tachometer indicates and records percentage stretch or shrinkage of materials processed through pairs of rolls turning at different speeds. Use is in textile, paper, plastics, rubber, chemical, and metal-rolling industries to record roll speed ratio.—**Weston Electrical Instruments Corp.**—Elec West, Dec, p54

Heat Exchangers—Model A-800 heat exchangers are designed for oil cooling in diesel engines, gasoline engines, and similar applications. They are used with engine-jacket water as coolant, maintaining balanced temperature between oil and water. Shell is lightweight, compact.—**Young Radiator Co.**—Oil & Gas J, Nov 23, p100

Battery Trammer—Locomotive weighs 1½-ton and is available for any track gage between 18 and 24 in. Rated drawbar pull is 400 lb. but a maximum of 750 lb. is obtainable. Locomotive is 44⅛ in. high, has folding cab.—**General Electric Co.**—Eng & Min J, Jan, p110



COLOR CARD HAS 15,000 COLORS

Silk color card containing about 15,000 different shades is woven by Walter Aebli & Co., Switzerland. The fabric has ¼-in. squares of color formed by 237 ¼-in. bands and filling. Colors in the fabric can be identified by numbers along each edge of the fabric.—Textile World, Jan, p147

Better Batteries—Lower maintenance costs and longer battery life are claimed for batteries with steel trays protected by special corrosion-resistant coating. Blows and abrasions can be withstood without flaking off of coating. Insulating quality of coating is high.—**Electric Storage Battery Co.**—Food Ind, Dec, p92

Multi-stage Pump—Class HMTA multistage centrifugal pump will operate at temperatures up to 650° F. and pressures up to 1,200 psi. Entire rotor assembly is removable as a unit from pump casing. Capacities range from 125-1,600 gpm., and pipe sizes from 3-6 in.—**Ingersoll-Rand Co.**—Chem Eng, Dec, p140

Electromagnetic Hammer Drill—Lightweight (11¾ lb.) and automatic bit rotation are featured in the model 10-RO hammer drill. It will drill holes in concrete, brick, or stone.—**Syntron Co.**—Railway Eng & Main, Jan, p64

Earth Auger—Twin-helix auger can drill hardpan, decomposed rock, and some kinds of caliche and sandstone. The twin-helix design eliminates back thrust against side of hole, making it possible to drill with less caving in sandy soil.—**Peterson Engrg. Co.**—Elec C&M, Dec, p93

Cargo Loader—Conveyor unit, called Mobiloader, consists of 21-ft. belt mounted on Dodge-truck chassis. Conveyor can be raised or lowered from 5½ to 11 ft. from truck cab. Searchlights on both ends give light for night loading of airplanes and handling of industrial jobs.—**Sage Equipment Co.**—Iron Age, Dec 28, p40

Dual-fuel Engine—Natural-gas changeover unit permits engine to burn either natural gas with a pilot charge of diesel fuel or diesel fuel alone. Unit is available on new engines or can be bought as a kit for engines already in use.—**Detroit Diesel Engine Div., General Motors Corp.**—Coal Age, Jan, p106

Spray Gun—A thumb screw on the back of new spray gun permits adjustment in spray pattern from 1 to 12 in. across. Spray may be projected in workable pattern to surfaces 6 ft. beyond normal reach.—**Eclipse Air Brush Co.**—Fleet Owner, Dec, p69

Wrapping Prevents Corrosion—Chippaflex VPI is a protective packaging material that inhibits metal corrosion and affords the protection of a flexible corrugated wrap. Clean metal parts can be wrapped dry in it. No heat or adhesive seals are needed.—**Chippewa Paper Products Co., Inc.**—Steel, Nov 27, p90

Cooling Tower—Type H atmospheric-spray tower is for small packaged air-conditioning and refrigeration condensing units. Ten sizes run from 3-35 tons. Slip-fit louvers are redwood or galvanized steel.—**Binks Mfg. Co.**—Power, Jan, p146

Stack Cartons Like Paper Cups—A lip around the top of each carton fits the indented bottom of the box above it. Interlocking feature eliminates the need for steel strappings when shipping large quantities of goods.—**Shelton Mfg. Co.**—Business Wk, Jan 6, p56

High-latitude Navigation Trainer—Ground training device is capable of reproducing polar-region navigating problems. Dome of trainer represents heavens of Northern Hemisphere plus 35° of Southern Hemisphere. Six students are accommodated at one time.—**Lear Aviation, Inc.**—Aviation Wk, Dec 25, p31

Impregnated Gloves—Plastic impregnated gloves are claimed to have good wear-resistant qualities and to be waterproof, snagproof, and resistant to heat and flame. Other advantages: good strength and high resistance to abrasion, acids, and alkalis. —**American Rubberizing Co.**—Foundry, Jan, p209

Aluminum-alloy Welder—Model PMCO2ST Modu-Wave three-phase spot welder is designed for welding the heavier thicknesses of aluminum alloy, including primary structural members in aircraft. Rating is 100 kva. at 50% duty cycle. Range is 0.025-0.081 on aluminum and magnesium and 0.022-0.156 on low-carbon steel.—**Sciaky Bros.**—Weld Eng, Jan, p45

ACID IN POLYETHYLENE JUG

Large molded polyethylene jugs for hydrofluoric acid adopted by General Chemical Div., Allied Chemical & Dye Corp., offer new convenience in handling this corrosive chemical. The new plastic jug provides a shatterproof, tough, acid-resistant, easy-to-handle package that will not develop leaks. It weighs 2 lb. compared with 17 lb. for a lead container.—Mod Packaging, Dec, p95

New Products (Cont.)

Filters Air—Electrostatic air filter utilizes dielectric properties of polyethylene and other plastic materials. When exposed to air current, material picks up electrostatic charge and thereby retains dust and smoke particles. Filter is easily cleaned by washing.—**Goodyear Tire & Rubber Co.**—Chem Eng, Jan, p143

Portable Gravel Plant—Gravel crushing, screening, and loading plant is mounted on a gooseneck truck for high degree of portability. Plant is designed for moderate production requirements.—**Universal Engrg. Corp., Div. Pettibone Mulliken Corp.**—Eng-News Rec, Jan 11, p127

Logging Arch—Model 78 logging arch, for use with Caterpillar D7 and D8 tractors, is used with tractor-mounted winch to haul logs to tractor landing. Arch has basic A-frame design with box-type structural members.—**Hyster Co.**—Paper Ind, Dec, p1008

LOW-COST ELECTRONIC ORGAN

Console-type electronic organ has been developed to sell for $800 instead of the usual minimum price of $3,000 for such organs. Main savings were made in parts and production costs. Organ, for example, uses 61 NE-2 gas diode tubes costing only 10¢ each. Tubes are in sawtooth tone generators that are synchronied to twelve master oscillators for frequency control. Keyboard has five octaves, or 61 notes. Two stops select vibrato rates and six stops are for tone color.—Electronics, Jan, p70

Shapes Dye Packages—Yarn-package shaper breaks down hard edges of yarn packages at rate of 3,000 per hr. Shaper cups move continuously. The operator places packages in cups at the rear of the machine. Packages are automatically ejected after forming operation.—**Gaston County Dyeing Machine Co.**—Textile World, Jan, p147

Dust-proof Starter—Motor starter for polyphase induction motors has gasketed enclosure to shut out dust encountered in textile industry and others. Rotary-action handle operates over-center toggle to give quick make and break. Rating is 600 v., 7½-hp. polyphase. Arc is quenched within one-half cycle.—**Westinghouse Electric Corp.**—Prod Eng, Jan, p173

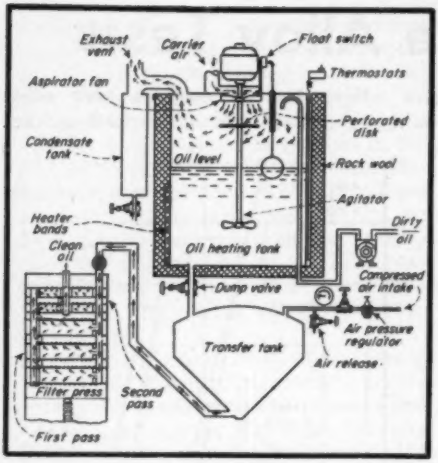
Telescoping Lift Truck—Tilting, telescopic driver-led electric stacker will tier to 131 in. Stacker operates in two speeds, either forward or reverse.—**Automatic Transportation Co.**—Auto Ind, Jan 15, p96

Bends Tubing Rapidly—Series 200 hydraulic press, operating at 20 strokes per min., bends tubing to various degree bends. Rocker die and three sets of rockers and side arms are furnished with hydraulic pressure pad. Reverse bends 5½ in. apart can be made.—**Gibbons Machine Co.**—Steel, Dec 4, p139

Unit Heater—Compact 16x13x17-in. heater for locomotive cabs or small buildings uses either steam or hot water. It is ideal for waste heat from hot-water engine jackets. Fan circulates air through radiator.—**Young Radiator Co.**—Power, Jan, p188

Drills and Bolts Mine Roof—Hydraulically operated roof drill and wrench provides drilling speeds up to 10 fpm. Unit features an automatic feed control. Hydraulic tilt of 45° to either side simplifies angle boring.—**Baker-Raulang Co.**—Coal Age, Jan, p102

Variable Speeds—Six models comprise variable-speed transmission series, known as Allspeed Drive. Units have tandem-belt design, which is well suited for close quarters. Ratings are 1, 3, 4, 7½, 10, and 15 hp. with variations of 16:1, 10:1, 9:1, 8:1, 6:1, and 6:1.—**Worthington Pump & Machinery Corp.**—Elec World, Jan 1, p95



REFINES DIRTY OIL

Automatic lubricating oil re-refiner of Youngstown Miller Co. removes impurities from crank-case drainings. Dirty oil is pumped into heating tank where absorbent refinery clay is added and the mass agitated thoroughly. Tank contents are dumped into transfer tank, then pumped through two-stage filter to produce clean oil.—Prod Eng, Jan, p117

Wood Planer—Stock capacity of single-surface wood planer is 13x5 in. Three-knife cutter head takes 210 cuts per second. Clutch control enables the operator to stop and start feed instantly. Solid steel cutter head can be removed without taking machine apart.—**Rockwell Mfg. Co.**—Ind Dist, Jan, p108

Fuse Coupling—Small fuse that breaks circuit instantly when a short occurs in connected lamp or extension cord is built into coupling. Unit fits standard wall outlet and has outlets for two cords.—**F. H. Smith Mfg. Co.**—Hardware Age, Jan 11, p144

Frozen Food Carrier—Insulated, light weight, collapsible food carrier keeps food frozen for more than 24 hr. in temperatures up to 95° and requires no dry ice or refrigerant. Capacity of carrier is 100-120 lb.—**Weber-Washburn Co., Inc.**—Business Wk, Dec 23, p30

Largest Injection Machine—Capacity of this machine is 300 oz., permitting production of injection-molded parts of a size and weight formerly impossible. Manual and automatic single-cycle control and adjustable speed control of injection ram are provided. Mold can be as large as 4x6 ft. — **Watson-Stillman Co.** — Mod Plastics, Jan, p124

Melting Furnace—Gas-fired furnace melts gray iron, brass, or bronze. Charge of 400 lb. gray iron can be melted in average time of 24 min. with minimum tap temperature of 2850° F. and consumption of 2,400 cu. ft. of 1,000-Btu. gas per heat. Lining life is about 300 heats with gray iron and 1,000 with brass or bronze.—**Reda Pump Co.**—Foundry, Jan, p208

Multi-ink Printing Press—Construction of this press, developed in Sweden, eliminates usual rubber rollers. The fountain is moved in direct contact with the print rolls carrying the rubber plates. Absence of rubber rollers permits color changes in 5 min.—**Sandy Hill Iron & Brass Works**—Mod Packaging, Dec, p144

Welt Printer—Permanent mark on welts is resistant to handling, stretching, and washing. No heat is used in imprinting method, transfer rolls are eliminated, and brands or color names can be changed rapidly.—**Perma-Print Co.**—Textile World, Jan, p154

Master Control—New electronic system, called Telemaster, is designed for centralized combustion and process control. Electronic link between master and actuator eliminates distance problem caused by centralization. Advantages: simplified and small panels, elimination of transmission lags, and greater accuracy of response.—**Republic Flow Meters Co.**—Iron Age, Jan 4, p410

READER SERVICE

As a special service to our subscribers, McGraw-Hill Digest will furnish without any charge additional information about any new product or technical development described. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y., U. S. A.

—THE EDITORS

High-Temperature Alloy Tests

Machining of high-temperature alloys for jet engines and other applications is investigated to make a hard job easier and quicker

JET-ENGINE PRODUCTION has focussed attention on the machinability of high-temperature alloys. These alloys include S-816, Inconel X, Timken 16-25-6, and certain stainless steels.

A research program sponsored by U. S. Air Force and carried on by Curtiss-Wright Corp. has revealed considerable data on the machinability of the alloys. The data should be valuable in planning tooling, selecting equipment, and establishing machining cycles.

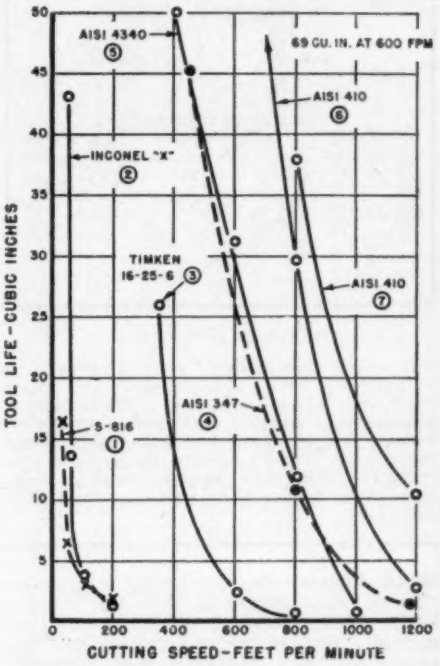
Alloy S-816—Essentially 20% chromium, 20% nickel, and 40% cobalt, this alloy in the annealed condition machines best at 0.009-ipr. feed and 100-fpm. speed with K2S steel-cutting-grade carbide. Tool life under these conditions is 4.5 cu. in. for 0.016-in. tool wear.

Solution treatment at 2250° F. for 2 hr. gives a seven-fold increase in stock removal per grind when cutting speed is dropped to 50 fpm. and feed is kept at 0.009 ipr. Aging further improves tool life. Cast-iron-grade carbides give best results in machining solution-treated alloy.

Inconel X—This alloy nominally contains 15% chromium and 73% nickel. Tool wear on Inconel X is not so rapid as on S-816. Cutting S-816 dry at 50 fpm. and 0.009 ipr. with K2S carbide gave a tool life of 17 min. For Inconel X at 0.011 ipr. and 50 fpm., tool life was 60 min.

Like S-816, solution-treated Inconel X is machined best with cast-iron grades of carbides, such as K6 and 44A. At 50 fpm., they have at least a two-to-one advantage over steel-cutting grades.

Unlike S-816, aged Inconel X is harder to machine than the unaged alloy. Solution-treated stock gives up to ten times the tool life of the aged material. So



***TOOL LIFE** is given for varying cutting speeds for six alloys. Feed is 0.009-0.011 ipr. Curves 1 and 2 are with K6 carbide, and curves 3 to 7 are with K3H carbide.*

it appears desirable to machine parts close to final size before aging takes place. A minimum of stock would then be left for grinding after aging.

Timken 16-25-6—This alloy has equivalent percentages of chromium, nickel, and molybdenum. It is seldom heat treated in its present application for turbine disks. Superior properties are attainable through work hardening.

But machinability of the solution-treated or stress-relieved alloy is so much

better than that of the work-hardened material that industry may find applications where rough machining may be done in one of these conditions.

Tool life in the solution-treated condition is up to three times as good as in the work-hardened state. In fact, solution-treated Timken 16–25–6 can be machined with K3H carbide ten times as fast as S-816 at half the wear land for equivalent stock removal and feed. K2S carbide was found to give even better results than K3H. Best feed range is 0.011–0.014 ipr.

In drilling Timken 16–25–6, a reasonable drill life of say 18 in. between grinds can only be attained at feeds less than 0.010 ipr. and speeds less than 18 fpm. Helix angles greater than the usual 28° give better results. Clearance angles commonly used on standard drills appear to be too large.

In the tests, standard 18-4-2 drills had a life about 30% greater than molybdenum high-speed drills. Cobalt high-speed drills were found to be about twice as good.

Stainless Steels—Tests were made on AISI 347 (18% chromium, 10% nickel stainless), AISI 410 (12% chromium stainless), and AISI 4340 (high-strength chromium-nickel-molybdenum steel).

Both stainless steels 347 and 410 and the 4340 steel machined better than the other high-temperature alloys. Acceptable tool life on annealed 347 is obtained at speeds up to 400 fpm. with K3H carbide. Annealed 410 machines at 800 fpm. and 0.010 ipr. almost as well as does 347 at 400 fpm. and 0.010 ipr. Tempered 410 machines even better.

With 4340 steel, tool life at 600 fpm. and 0.010 ipr. is only one-third that for tempered 410. To get a reasonable good tool life, the cutting speed should be under 400 fpm.

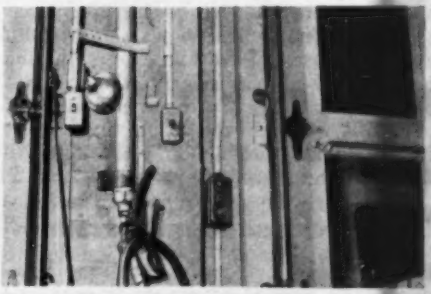
Coolant improves tool life at 400 fpm. At higher speeds, cutting fluid shortens tool life. A short interruption in coolant flow results in the carbide cracking.—Am Mach, Dec 25, p99

New Theory on Metal Cutting Depends on Microstructure

Research engineers of the Ford Motor Co. have come up with a new concept in machining metal. The theory is that the machinability of a metal depends on its microstructure. And you can control microstructure by heat treatment before machining.

Slight variations in microstructure of a steel have a profound effect on tool life. Once the microstructure of any piece of steel has been determined, the relationship between tool life and cutting speed becomes fixed, regardless of the composition and hardness of the steel. Know the microstructure of the piece being cut, and you know the cutting speed that will give you the best tool life. It means faster machining at lower cost.

Ford has found that salt-bath annealing gives good results. A shift from conventionally treated forgings to salt-bath annealed material increases parts production between tool grinds. After machining, the part can still be heat-treated again to develop desired properties.—Business Wk, Jan 13, p64



KEEPS OIL FROM FREEZING

Infrared lights keep a constant flow of oil from a buried supply tank in a severe winter region. Before installing the lamps, oil stiffened in exposed pipes. Youngstown Municipal Railway solved the problem by heating the pipes with infrared lights, keeping the oil in a fluid state.—Bus Trans, Dec, p37

World's Crude-Oil Output Reaches New High Record

Last year, the world production of crude oil resumed its upward trend after a temporary leveling off in 1949. Output in '50 averaged 10,377,000 bbl. daily—up 11.5% from '49. This average includes an estimate for Russia and Eastern Europe.

Largely responsible for the upturn was the recovery of U. S. production, averaging 5,403,000 bbl. daily to achieve a gain of 7.2% over the previous year. Total foreign production of 4,974,000 bbl. per day represented an increase of 16.7% over '49. In '49, foreign production had advanced over that of '48 by 11%, whereas U. S. production had fallen 8.6%.

An outstanding feature of last year's oil output was the development of the Middle East as a producing center to meet a large part of Eastern Hemisphere requirements. Gain over '49 was nearly 25%. Iraq had the huge percentage gain of 56.5%.

Other countries establishing new production records included Venezuela, Canada, Colombia, Mexico, Germany, Holland, Egypt, and British Borneo. Venezuelan production was in sharp contrast to that of '49 when it was drastically curtailed because of the drop in the heavy fuel-oil market in the eastern part of the U. S. During the latter half of '50, it was believed to be virtually at its maximum producing potential.—Oil & Gas J, Dec 21, p204

Electric Heat Removes Snow

Snow removal from sidewalks, driveways, and garage entrances is easy and quick with radiant-heating installations. Such installations have an electric heating cable placed within rigid steel conduit and buried in the concrete or ground.

A typical installation, designed to melt 1 in. of snow per hr. at 26° F. air temperature, would have 1-in. galvanized conduit spaced to carry 32 watts per sq. ft. This loading can be obtained by spacing conduits on 6-in. centers and burying them 1½ in. deep.

Conduits should terminate in a pull box that contains copper terminal strips for the cables. The cable is lead-sheathed and is available in 60-ft. lengths for 120-volt service and 120-ft. lengths for 240 volts. The 60-ft. cable consumes 420 watts and develops a maximum sheath temperature of 165° F.—Elec C&M, Dec, p57

Pain Killer to the Front

Acetyl-p-aminophenol, which is known to the trade as APAP, is drawing attention as an efficient analgetic. It combines safety with rapid action. No toxic symptoms of any sort have been observed in over 1,000 clinical cases; some subjects received 60 grains a day for 6 weeks. While its higher price makes it no competition for aspirin, APAP should find wide use in special preparations for relief of headaches and other minor pains.—Chem Ind Week, Jan 20, p19

Drill Spans Assembly Line

In building Britain's biggest tank, the Centurion, the Barnbow Ordnance Factory has installed novel equipment for drilling and tapping engine and gearbox mountings.

As the hull moves down the assembly line, it passes under a bridge structure spanning the line. The cross-member of the bridge is a slideway carrying a specially adapted radial drilling machine.

Drills are guided by jigs locating from bores of final drive brackets. Vertical holes are drilled with extension drills where necessary.

Horizontal holes are drilled with a right-angle attachment through a universal jointed shaft. Feed is applied manually by a star wheel actuating the quill in which the drill spindle of the attachment runs.—Mach, Dec 23, p1835

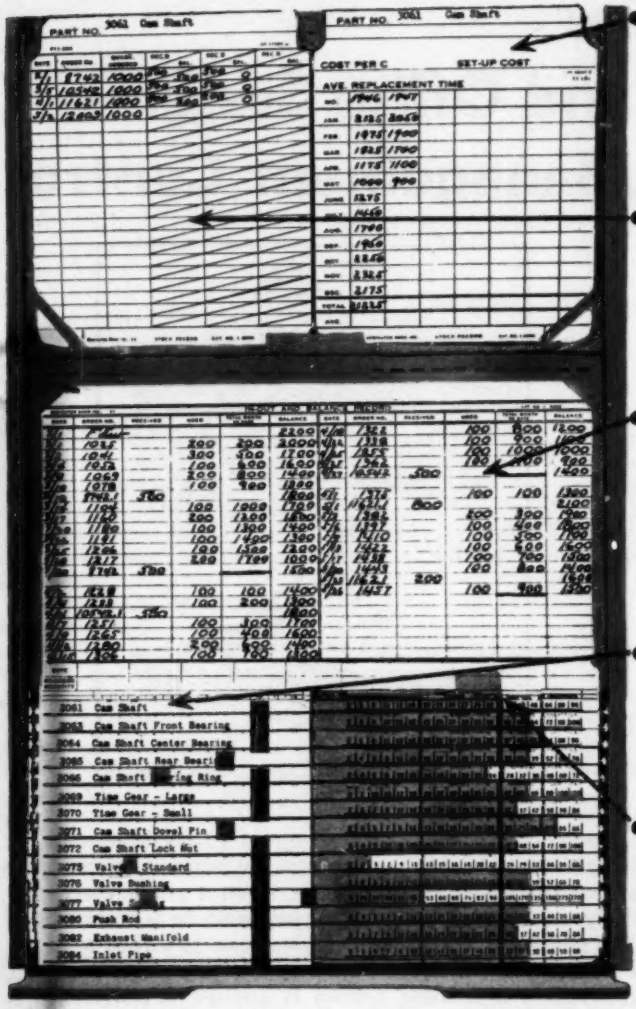
Report to Management

Business and Office Systems Improve Management Control

You Can Increase Office Efficiency and Cut Costs with Up-to-date Systems and Procedures That Handle Routine Paper Work

Business expansion, changing conditions, and progress in facilities and methods demand application of scientific management to business systems. Basically, this is what any business system must do: it must produce efficiently and economically, and it must help the organization be successful. Last month we told you about modern office machines and how they were employed to speed business and cut costs. This month we plan to show you, first, how a fact-finding and filing system is applied to different management controls and, second, how you can study or design office procedures. This second part will show you how to find and then apply the best method for building and maintaining an efficient, economical and successful office operation.

Simplified Inventory Control Increases Profits



● *The Record of Sales or Consumption may last 14 years — 7 years on one side and 7 years on the other. This is a guide of tremendous value when ordering or when checking trends in demand.*

● *The Record of Orders and Receipts, a split card, usually lasts about 3 years on one side and 3 years on the other, providing a clear picture of orders placed over a substantial period of time.*

● *The Record of In, Out and Balance may last only a few weeks. It serves its purpose in giving a day-by-day picture of stock condition. But the Summary of Sales is not lost when the card is filled. Monthly sales summaries are posted to the more permanent card above.*

● *Permanent data and indexing information are recorded on the Title Insert, that stays in the pocket at all times — never has to be retyped during the life of the item.*

● *The Graph-A-Matic Signal with The Chart That Thinks automatically indicates when each part should be analyzed for ordering. Clerical and executive attention is concentrated on just those items which require attention.*

***KARDEX INVENTORY CONTROL** allows fast, accurate decisions when ordering materials. You can take advantage of every buying opportunity. All the facts you need for effective ordering are assembled in one compact record. Visual signals show which items are short, which items are overstocked. Detailed facts on current disbursement and past usage are available, permitting quick analysis of seasonal requirements and trends in demand. Instant reference to this visible record saves time for customers, salesmen, and executives.*

Successful Record-Keeping Methods

How does your record control system operate? Can you instantly determine the status of your inventory, sales, production, personnel?

As the size and complexity of a business increase, the amount of detail and paper work increases in proportion. Chances of error and consequent losses also increase.

Remington Rand Inc., in its Kardex system, has developed a method of control that it believes will provide a positive and accurate check on the many features of a business organization. Kardex gives you a graphic summary of the facts needed in good management. The finding-and-filing operation is speeded up with centralized records, and specialization is assured by the flexibility of Kardex.

How You Can Use Kardex In . . .

Inventory Analysis—Profits come from goods that move and not those that lie in the stock bins. Without effective inventory control, a business can quickly become unprofitable.

The first requirement for an efficient inventory control system is a well designed form on which the required information may be recorded. With Kardex, each kind of basic information is segregated on a separate form, yet all the data concerning a particular item are centralized in a single Kardex *visible pocket.*

A record of orders and receipts, kept on a split card, provides a clear picture of orders placed over a period of time. Sales or consumption data can be recorded on another card facilitating a check of trends in demand. A day-by-day picture of stock condition is kept on the *in, out* and *balance card.*

The *graph-a-matic signal* automatically indicates when each item should be analyzed for ordering. A glance at the file will determine the general status of stock. Costly overstocks are obvious. Items due for reorder cannot be neglected. Controllable shortages are anticipated and prevented.

Sales Control—Three ways to increase sales are: (1) to obtain new, profitable customers, (2) to awaken dormant customers to action, and (3) to increase sales to active customers.

Before you can start profitable action on any of these three methods, you may need a clear picture of your over-all sales effort. That is where Kardex fits in.

By simplifying record keeping, accurate data on the sales effort can be obtained quickly in a readily useable form. Kardex graphically charts the actual sales against the designated quota. One of these three methods can be used: (1) control by individual accounts, (2) control by individual salesmen, (3) control by branch or territory.

Control by accounts is the most widely used of these techniques. Here is how Kardex does the job. When sales to an account fall below the quota, the *graph-a-matic signal* indicates that fact to the sales manager. Two other signals show the month of the most recent order and the month of the last call on the account. The latter is important. It is easily possible to have an account's sales up to quota, while more business could be had through more calls.

A monthly summary of sales for 2 years can be entered on a split card. This information, together with the dates of calls, gives management valuable data for analyzing weakness, setting quotas, and checking sales trends.

Current sales data is posted to another form. Beneath this form is a yearly

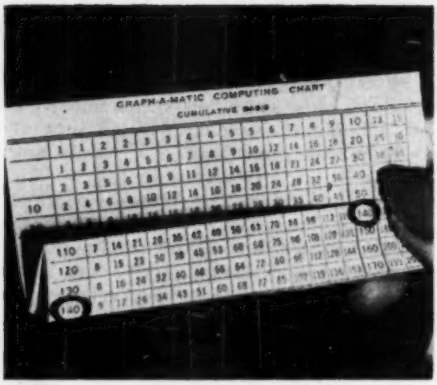
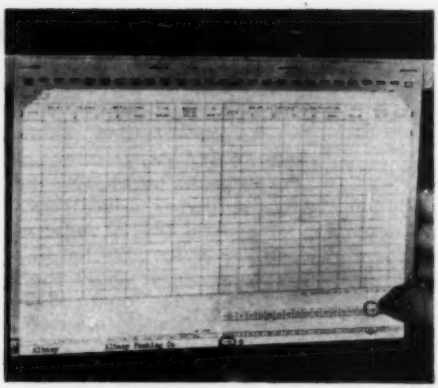


***CHART THAT THINKS** is folded above the quota figure in the 100% column, and folded again below the same figure in the left hand column. Chart is placed in visible margin.*



***COMPUTING CHART** figures now appear above the percentage scale on the Title Insert, and the quota figure appears at center through a cut-out in the Insert.*

summary covering "sales by product classification" for the last 20 years.

The job of computing percentages of sales-to-quota is simplified by a device that Remington Rand calls *the chart that thinks.* As the month's sales figures come in, the clerk subtracts the sales for the same month last year, adds the current month, and moves the signal to that figure on the upper scale. The percentage of gain or loss for the last 12 months is shown automatically.

This is one approach to the sales control problem. The flexibility of Kardex allows it to be adopted to suit the requirements of any sales organization.

Production Control—To stay ahead of competition, the progressive manufacturer must maintain schedules and keep customer delivery promises. That means assembling raw materials, parts, and equipment in advance. And that means careful planning. This is what is needed: a complete and well-organized record system for material and production control.

Here is how the Key Co., Ill., employs Kardex in meeting customer requirements. The Key Co. is engaged in making castings of eight different analyses of steel for the oil-refining industry.

Each steel has its own identification number and is housed in a separate Kardex *visible cabinet.* Each item on each customer's order is entered on a Kardex card and filed by job order number within the proper cabinet and slide. The visible margin shows the pattern number, job order number, flask size, and net pounds due to cast on the order.

The card in the upper pocket is the foundry operations order card. It gives full information about the order, pattern, steel, schedule, and production against schedule. The card in the lower pocket records heat numbers and dates of production and shipments.

Since the visible margin shows the total number of pounds due, visual control is established. The *graph-a-matic signal* is set over this quantity. As heats are poured, the signal is retracted to show balance still due against the foundry order.

Because all cards for the current and next week for each steel are filed together in two racks, the signals show which

orders are ahead of schedule, on time, or lagging behind. Thus management-by-exception is automatically provided. Knowing about the exceptions as soon as they occur allows management to start corrective action. As a result, promises to customers are kept.

Personnel Administration—Modern management now accepts personnel administration as necessary for sound business practice. Production largely depends on the exact matching of men to job specifications. Management must have facts that can be analyzed for proper job evaluation and placement. It is only from complete personnel records that such facts can be obtained.

The Kardex *visible employee's history record* form has been devised to bring the pertinent facts about each worker into a compact, easy-to-use, time-saving file.

The employee's application form is part of the file. It contains complete personal data in condensed and concise form. Numbered spaces at the right of the visible margin are used for cross indexing for any one of the 74 job classifications. The proper squares are marked. In this way, all applicants qualified for a certain opening can be spotted instantly from these marked squares without looking at the body of the card.

Opposite the application form is the employee's history record. On it, four records are kept: (1) employment history, (2) lost time and accident, (3) record of warnings, and (4) summary of earnings.

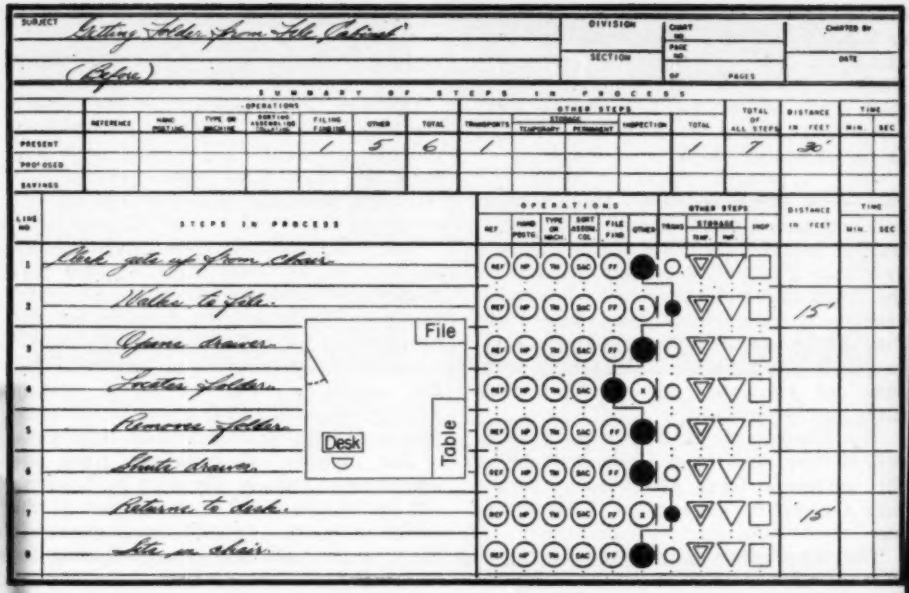
The visible margin contains additional data. Sex, job classification, plant and department number, clock number, and the year employed have squares for the necessary information. A *graph-a-matic signal* over the percentage scale indicates the employee's current merit rating. This provides a visual guide to the comparative working efficiency of employees.

The number of warnings given the employee to date is signalled by blocking out the numbers of the upper part of the visible margin. An additional square is filled in for each additional warning.

Specialized forms, such as lost-time and accident records, training records, seniority ratings, payroll records, and physical-examination records can be easily adapted to suit any personnel-department requirements.

***OUCHING** a control bar of this Robot Kardex isible File brings any slide into immediate writ-g position. Clerk spends nearly all her time posting.*

***KARDEX CABINET** contains detail records providing visual control of management facts. Records are easily accessible to clerk, permitting fast, accurate posting and referring.*



***PROCESS ANALYSIS WORK SHEET** shows how simple office routine is charted. Each operation is noted under "Steps in Process". Proper symbol is marked and total of all steps required and distance moved are entered. Improved procedure would consist of moving file to behind desk. Total steps become 6. Distance saved is 30 ft. Changes save time, reduce worker fatigue.*

How To Make an Office-Methods Study

FUNDAMENTALLY, studies of office methods and plant management require the same approach. Both are aimed at finding the best way of doing a particular job. And the best way is usually the one that requires the least time and work at the lowest cost.

In the factory, application of operation analysis and scientific engineering principles of management has enabled industry to make huge gains in productive power while reducing operating costs. Office methods have not kept pace with this advancement. Some office functions have been mechanized, but usually clerical operations have not been studied.

The increasing complexity of doing business makes complete, accurate office work and record keeping a vital necessity. Mechanization of office operations is not sufficient. Methods and procedures employed in conjunction with machines can produce important results for management—but only if subject to proper study, analysis, and control.

Here are the basic objectives needed for making an office-methods study:

- Eliminate operations that waste time and money.
- Combine details that cannot be directly eliminated.
- Change the sequence of work to have specific operations performed at a better or more economic time.

• Simplify the procedure with up-to-date forms, machines, and methods.

In office-methods work these elements should be analyzed: forms, reports, filing, equipment, space, personnel, and procedures. The most practical way to get all the facts in a study is to employ analytical charts. These charts graphically picture the essential elements of the process studied. Once the process is analyzed, the chart can help in making improvements in the process.

The Flow Process Chart

For office-methods studies, the Flow Process Chart provides the best means. It presents information necessary in making a methods analysis and may include time required and distance moved.

Standard charting symbols, representing basic actions, are used in making the charts. Basic actions are described as follows:

Operation—A large circle designates an operation. Any action that changes the characteristics or condition of an object that is part of a process is termed an operation.

Transportation—A small circle indicates transportation. Moving an object from one place to another by a person or any mechanical device carrying the object is defined as transportation.

Storage—There are two types of storage: temporary and permanent. Temporary storage, a small triangle within a larger triangle, occurs when an object is kept for further processing. Permanent storage, designated by a large triangle, occurs when an object is kept at a point designated as the final storage place for the object. When a form is discarded or destroyed, this is usually indicated by making the permanent storage triangle in solid black.

Inspection—A square designates inspection. Examination or verification of an object, but not changing it, is termed inspection.

Here are a few hints that will help in classifying an action:

Classification	Predominant Result
Operation	Produces or accomplishes
Transportation	Moves
Storage	Keeps
Inspection	Verifies
Delay	Interferes

The charting operation is usually supplemented with a Factual Analysis when record keeping is involved. Essential data that serve as a means of determining the validity of conclusions drawn from process charts are revealed by means of a Factual Analysis.

The Factual Analysis will indicate the following:

1. Statistics regarding the number of accounts or items, the number of postings, etc., necessary to determine the total operational time.
2. A listing of the personnel required to operate the system in order to project in terms of clerical hours over-all operations and costs against estimated savings.
3. The method of indexing the record may require revision in order to facilitate better operations.
4. The physical conditions under which the operations are conducted are important as they directly contribute to the success or failure of over-all efficiency.
5. Exceptions to the normal routine must be taken into consideration so that proper provision may be made for their execution with as little inconvenience as possible.
6. Controls must be known and definitely established.
7. The value of the equipment subject to the record keeping should be determined.
8. Cost of replacing the record in the event of its destruction.
9. The method of operation must be known as any change in the work method

Mechanization of Office Plus . . .

MODERN OFFICE LAYOUT provides ample room for work. Equipment is located to afford easy access with minimum effort and time.

FAST, ACCURATE operation of this printing calculator is facilitated by pre-sorting invoices with the aid of a sorting device.

might necessitate a completely new type of process.

Once the Factual Analysis has been completed, preliminary work can be started on the Flow Process Chart.

How To Compile Data

The most important phase of charting is compiling the data. An acurate record of the steps must be made in their exact sequence. Space is provided on the chart for a brief, clear description of each step in the process. Steps are described in the order of their occurrence and distance and time required for important steps are shown. Only one step or combined step is written in each space. (see p 52). A common example of a combined step is an operation and inspection that are performed simultaneously.

Notes may be taken for complicated operations. Later, the notes are correlated and transferred to the work sheet. Sketches may be desirable for unusual cases.

Every process is reduced to its simplest steps, and every step becomes a part of a combination. Thus, apparently complicated operations are reduced to a series of simple and related elements.

Space is also provided for showing the total number of each type of operation; transportation; storage, permanent and temporary; inspection; total distances and total time required for both the present and proposed methods. This summary is important as it provides the means by which the present and proposed procedures may be measured, in the light of the Factual Analysis, to determine the specific requirements and the net results that will be secured.

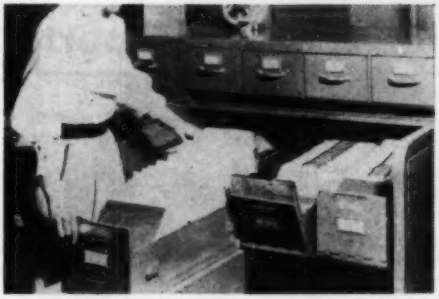
How To Interpret Chart

When all the data pertinent to a given process have been assembled and charted, analysis and interpretation of the Process Chart begins. Existing procedures must be subjected to the closest analysis to determine the changes that should be made. Proposed methods must be analyzed with equal care to warrant securing best results.

Nothing should be taken for granted. Each detail should be questioned carefully and thoroughly. These questions will serve as guides in the analysis:

1. **Why** is this operation being done and is it necessary?
2. **What** is being done and what is its purpose? What makes it necessary? Can previous processes be changed to eliminate its necessity?
3. **Where** should the work be done?

. . . Modern Methods Equals Efficiency



FILE DRAWERS are located for convenient filing and finding. Clerk is working from the side of the drawer, not the front.

KARDEX VISIBLE FILE permits fast fact finding while bookkeeping machine with handy ledger file mechanizes accounting.

4. **When** is the work done? Could it be done better and more economically at another time?

5. **Who** is doing the work?

6. **How** is the work performed? How is the best way to do it?

The necessity of any operation can be determined by the application of the basic objectives of an office-methods study—eliminate, combine, change, and simplify.

Here are some cautions to observe when trying to obtain these objectives: Do not try to combine unrelated records. Do not eliminate operations without carefully checking the effect of such action. Do not change a sequence to solve a problem at one point if it creates serious difficulties at another place. Do not simplify too much.

A proposed procedure is recorded on another Flow Process Chart using the methods of analysis outlined above. The proposed procedure is described in detail, and the various operations are totalled. Savings can be computed from the present and proposed totals.

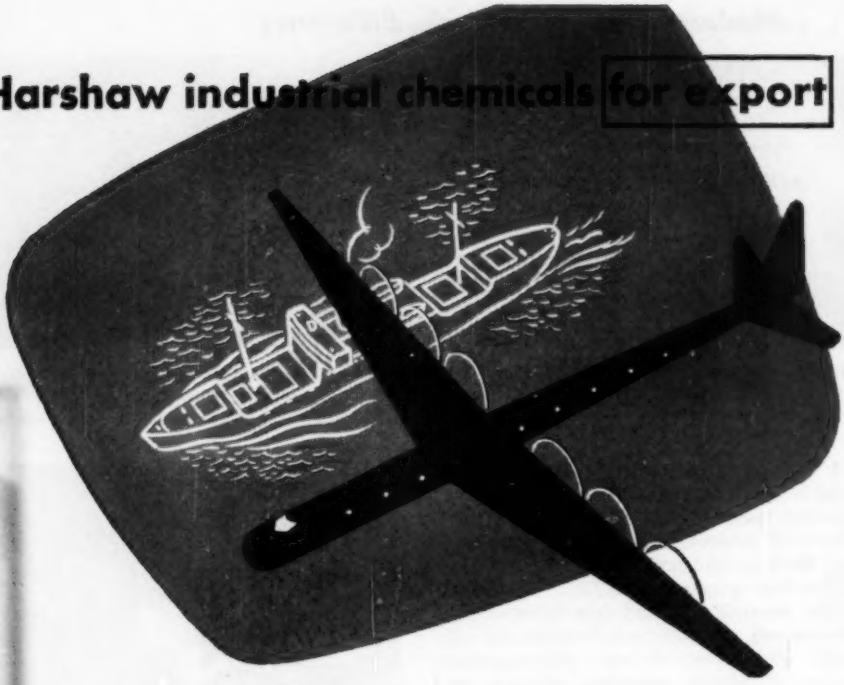
TYPING STATION features posture chair, copyholder, and correct typing level for minimum operator effort and maximum production.

INSULATED FILE DESK provides protection of valuable records against loss by fire. All files are neatly arranged within reach.

Thanks to . . .

. . . the Export Division of Remington Rand, Inc., whose valuable help made this report possible.

Harshaw industrial chemicals for export



CERAMIC—Ceramic Colors • Uverite (Opacifier) • Antimony Oxide • Tin Oxide • Chrome Oxide Green • Cadmium Sulfide

PAINT, VARNISH, AND PLASTIC—Driers And Other Metallic Soaps • Cadmium Lithopones • Antimony Oxide • Chrome Oxide

ELECTROPLATING—Nickel Salts: Sulfate, Chloride, and Carbonate

CATALYTIC PROCESSING—Aluminum Chloride Anhydrous • Antimony Trichloride • Boron Trifluoride • Boron Fluoride Etherate • Hydrofluoric Acid • Nickel Formate

MISCELLANEOUS—Hydrofluoric Acid • Ammonium Bifluoride • Miscellaneous Fluorides • Synthetic Optical Crystals • Copper Naphthenate • Copper Oxychloride Sulfate • Cobalt Sulfate and Carbonate

Shipment of the products listed above is at present subject to the availability of raw materials.

WRITE FOR CATALOG

This 32-page book alphabetically lists all chemicals available and describes Harshaw's major activities.

THE HARSHAW CHEMICAL COMPANY

Export Division D **CLEVELAND 6, OHIO**

CABLE ADDRESS: HARSHAW-CLEVELAND

Production Ideas

from Manufacturers' Catalogs

3-1 Food-processing Machines—Food Machinery & Chemical Corp. 24p. Equipment for processing, freezing, and handling foods is described in bulletin PRA-950. Also covered are insecticides, tractors and implements, and packaging machinery.

3-2 Improved Alkylation Process—M. W. Kellogg Co. 8p. Kelloggram No. 5 discusses new developments in production of high octane aviation fuel by the alkylation process.

3-3 Automatic Molding—F. J. Stokes Co. 24p. Brochure "Fully Automatic Molding of Thermosetting Plastics" describes the origin and growth of automatic molding. Advantages and cost savings by automatic molding are described.

3-4 Electric Pallet Truck—Towmotor Corp. 18p. A compact, powerful, pallet-type truck designed to handle pallet loads weighing up to 4,000 lb. is described in booklet SP-5.

3-5 Porous Media—Carborundum Co., Refractories Div. 56p. Booklet 5118 covers many applications of ceramically bonded porous media. Tables, charts, and illustrations supplement information on uses, design, installation, and operation.

3-6 Piping, Fittings, Valves—Grinnel Corp. 28p. "One Hundred Years of Piping Progress" contains information on the products and services available from Grinnel Corp.

3-7 Refrigeration Equipment — Frick Co. 64p. Bulletin 80-B describes refrigeration, ice-making systems, and compressors in the Spanish, Portuguese, and English languages. Mark on coupon language desired.

3-8 Facts and Figures—Pioneer Engineering Works, Inc. 62p. Booklet 521-10 contains tables and charts on crushing, screening, washing, and handling of aggregates.

3-9 Bifurcators — American Machine & Metals, Inc. 12p. Catalog DB-4-49 describes direct motor-driven fan with a split housing for exhausting destructive gases. Motor is isolated from gases.

3-10 Recording Gages—Bristol Co. 32p. Gages for pressure, vacuum, absolute pressure, barometric pressure, and differential pressure for use in many applications are described in bulletin G621.

3-11 Industrial Finishing Equipment—R. C. Mahon Co. 12p. Catalog A-650 illustrates major units of equipment for complete finishing systems.

3-12 Brick and Tile Machines—Fate-Root-Heath Co. 20p. De-airing and automatic cutters for the clay-brick and tile industry are described in bulletin 15.

3-13 Electric Hoists—American Engineering Corp. 36p. Full line of trolley and suspension electric hoists with low headroom feature is contained in catalog H-46.

3-14 Coal-tar Products—Neville Co. 32p. "Resins and Plasticizers" contains complete data, including industrial uses, on resins and plasticizers.

3-15 Water Eliminators—Jas. A. Murphy & Co. 24p. General catalog contains detailed description of devices for cleaning and drying compressed air.

3-16 Fluid-power Equipment — Oilgear Co. 8p. Complete line of fluid power pumps, motors, transmissions, cylinders, and valves is discussed in bulletin 10051-A.

3-17 Mining, Processing Machines—Jeffrey Co. 48p. Information on equipment for the mining and processing industries is found in booklet 832.

3-18 Synthetic Rubber Parts—Allis Rubber Corp. 32p. "Mechanical Molded Parts of Synthetic Rubber" catalog covers compounding, molding, and mold design of different synthetic rubbers.

3-19 Hard-facing Alloys—Stoody Co. 44p. Description of hard-facing alloys for hand and automatic application is contained in "Stoody Hard-facing Alloys".

3-20 Spray Nozzle Systems—Schutte & Koerting Co. 8p. Design, application, construction, and operation of spray nozzles and diagrams of typical spray-pond arrangements are contained in pamphlet 6A-SP.

3-21 Multi-drive Power Table—Niagara Machine & Tool Works,. 12p. Machine for beading, crimping, burring, turning, wiring, flanging, elbow edging, furnace-collar edging, and other sheet-metal operations is described in booklet 85-A.

Production Ideas (Cont.)

3-22 Tube and Pipe Fittings—Weatherhead Co. 28p. Data on industrial tube fittings for hydraulic or hazardous liquid installations are contained in catalog F-1456.

3-23 Mechanical Tools—L. S. Starrett Co. 288p. A wide variety of precision tools, steel tapes, dial indicators, and hack saws is contained in catalog 26.

3-24 Diesel Engines—Nordberg Mfg. Co. 18p. Bulletin 173 describes stationary diesel engines of 4,000- to 9,600-hp. capacity. Bulletin 175 covers marine direct-reversing diesel engines.

3-25 Conveyor and Elevator Belting—Thermoid Co. 16p. Bulletin 3679 contains a discussion of various belting types and suggestions for their use.

3-26 Dust Control—American Air Filter Co. 36p. Installations illustrated in booklet 270-A-60H-8-50-C show how dust control systems operate.

3-27 Turbine Generators—Elliott Co. 40p. Bulletin H-18 illustrates and describes industrial and utility turbine-generator installations. Brief discussion of generator and exciter cooling methods is included.

3-28 Surfacing Alloys—Airco Co. International. 20p. Wear-resistant surfacing alloys, uses, properties, and a brief outline of recommended procedures are included in catalog 11.

3-29 Test Cement, Concrete, Soils—Precision Scientific Co. 20p. Approved apparatus for testing cement, concrete, and soils according to standard test procedures is described in catalog 230, Section 2.

3-30 Power Transmission Equipment—Lovejoy Flexible Coupling Co. 56p. General catalog describes flexible couplings, variable speed pulleys, and universal joints required for mechanical power transmission.

3-31 Measures Thickness — Sheffield Corp. 16p. Catalog MY-50-1 describes a non-contact X-Ray gage for continuous or intermittent measurement of strip or sheet stock while in motion or stationary.

3-32 Dry-chemical Piped Systems — Ansul Chemical Co. 4p. Brochure F-5021 covers a fire protection system using dry chemical.

3-33 Motor-driven Compressors — Chicago Pneumatic Tool Co. 24p. The horizontal duplex motor-driven compressors described in bulletin 726-5 have anti-friction roller bearings throughout.

3-34 Mercury-bulb Instrumentation — Partlow Corp. 24p. Temperature sensitive mercury-bulb element described in pamphlet 101 can actuate many types of mechanisms.

3-35 Crawler Tractor — International Harvester Export Co. 24p. Catalog E-6-A outlines many features of the TD-24 diesel crawler tractor.

3-36 Magnetic Equipment—Dings Magnetic Separator Co. 8p. Both electric and non-electric magnetic devices for removing tramp iron from liquids or solids are covered in pamphlet C-5000 A.

3-37 Centrifugal Pumps — Pacific Pumps Inc. 8p. Single stage pumps for continuous process service are described in bulletin 108.

COPIES of these manufacturers' catalogs will be sent free to subscribers. Fill in squares with catalog numbers desired and mail to the Editor, McGraw-Hill Digest, 330 W. 42nd St., New York 18, N. Y., U. S. A.

Not good after June 1, 1951. (This coupon MUST be completely filled in. Please TYPE or PRINT.)

Name .....

Title .....

Company .....

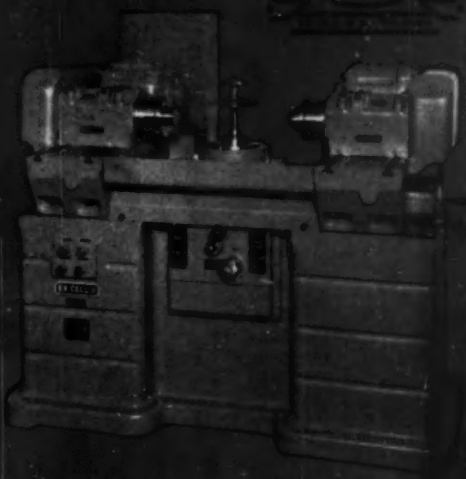
Address .....

.....

EX-CELL-O

PRECISION BORING MACHINES

Typical of the machine tools that have made the Ex-Cell-O name famous are its machines for such metal working operations as precision boring, turning and facing. The Ex-Cell-O Style 1212-A machine shown here accommodates small and medium size parts and may be tooled for work in small lots or large volume. One or more precision spindles or boring heads can be arranged on each machine bridge. The controls of the hydraulically operated machine table are easily adjusted to obtain an automatic cycle which may include rapid movement, two infinitely adjustable feed rates, immediate or dwell reverse and stop in both directions of travel.



This and many other Ex-Cell-O products are fully described in Catalog 27281. Use the coupon below to get your copy.

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN, U.S.A. • CABLE ADDRESS: XLO DETROIT, U.S.A.

PRECISION MACHINE TOOLS - CUTTING TOOLS - MACHINES TO PRODUCE MILK IN SANITARY PAPER CONTAINERS

Machine tools, grinding spindles, hydraulic power units, tool grinders—all these and many more Ex-Cell-O products are concisely yet completely described in Catalog No. 27281. Write for your copy. There is no charge.

EX-CELL-O CORPORATION
Detroit 32, Michigan, U.S.A.

Please send without obligation copy of Ex-Cell-O General Catalog No. 27281.

Name _____

Company _____

Address _____

City and Country _____

Are You Missing Out On These Special Services Of The Digest?

Every month the Digest brings you a summary and analysis of the latest developments in business, industry and science. These articles are directly or indirectly helpful to you in your work. But the Digest offers many other services. We want to be sure that you, as one of our regular readers, are enjoying full use of all its benefits.

You'll Get Much More Out Of Your Digest If You . . .

- **ASK** us for the complete original article in which you are interested. Be sure to quote title, page and month of publication plus source of information at the end of the article.
- **ASK** us for more information on new products. We shall be glad to send you the original article. We shall also ask the manufacturer to send you additional information.
- **ASK** us for manufacturer's catalogs. They contain valuable engineering information besides product listings. Just send the coupon in the "Production Ideas from Manufacturer's Catalog" department.
- **READ** the advertisements. They offer you the tools of efficient management. For more information write directly to the manufacturer—or send your letter to us.
- **WRITE** us about your special technical problems. Where possible we will offer advice. For lengthy or involved problems we will try to offer sources of information and recommend engineering firms with experience in such lines.

Very truly yours,

Harry S. Wharen

Your key to better
PREVENTIVE
MAINTENANCE

REMINGTON RAND
"KNOW-HOW"

It's just poor business not to get the *most* from your machines and other expensive equipment. Particularly when a system so simple as Kardex Visible keeps them working full time... prolongs their useful life... saves money on repairs. This is only one of the ways Remington Rand "Know-how" service lowers your operating costs... puts you ahead of competition.

...in Preventive Maintenance

Kardex Visible records save you major repairs later, by systematically reminding you to make small ones now – *when they're needed.* They give you a complete "picture" of each piece of equipment... show when lubrication is needed... when inspection dates fall due... what parts replacements are needed, and when.

...in Purchasing Control

Kardex Visible records help you in purchasing too—by giving you all the data on each item on *one* convenient card. Without searching through files, Kardex gives you complete specifications for each item, a record of orders placed, showing quantity, discounts, shipping point, prices.

This "Know-how" Service is available in principal cities of the world.

REMINGTON RAND
"Know-how" Service also for:

- Sales
- Inventory
- Personnel
- Accounting

SEND THIS COUPON TODAY FOR MORE INFORMATION
Remington Rand Inc., Export Division, Dept. E-26
315 Fourth Ave., New York 10, U.S.A.

Please give me the details about your "know-how" service on control of_____

Name_____

Company_____

Address_____

City and Country_____

ADVERTISERS IN THIS ISSUE

ALLIS-CHALMERS MANUFACTURING CO. ..... 4th Cover
Compton Advertising, Inc.

AMERICAN CYANAMID CO. 14
Hazard Advertising Co.

DOW CHEMICAL OF CANADA, LIMITED .. 4, 5
Harold F. Stanfield Ltd.

EX-CELL-O CORPORATION 59
Holden, Clifford, Flint Inc.

FOOD MACHINERY & CHEMICAL CORP. 2
McCarty Co.

GOVERNMENT OF CANADA 64
Walsh Adv. Co., Ltd.

GENERAL MOTORS OVERSEAS OPERATIONS 10

H & B AMERICAN MACHINE CO. 6
George T. Metcalf Co.

HARSHAW CHEMICAL CO. 56

INTERNATIONAL HARVESTER EXPORT CO. ..... 3rd Cover
McCann-Erickson Corp.

McGRAW-HILL BOOK CO. 63

MONSANTO CHEMICAL CO. 9
Gardner Advertising Co.

NORDBERG MANUFACTURING CO. 1
Russell T. Gray, Inc.

REMINGTON RAND, INC. 61
Leeford Advertising Agency, Inc.

STANDARD OIL COMPANY (NEW JERSEY) .. 13
Foreign Advertising & Service Bureau, Inc.

YODER COMPANY ..... 2nd Cover
G. M. Basford Co.

Publications Digested:

McGraw-Hill Publishing Co. Inc., 330 W. 42nd St., New York 18, N. Y.
American Machinist • Aviation Week • Bus Transportation • Business Week • Chemical Engineering • Chemical Industries • Coal Age • Construction Methods & Equipment • Electrical Construction & Maintenance • Electrical Merchandising • Electrical West • Electrical Wholesaling • Electrical World • Electronics • Engineering & Mining Journal • E & M J Mineral & Metal Markets • Engineering News-Record • Factory Management and Maintenance • Fleet Owner • Food Industries • Industrial Distribution • Machinist (London Office) • Nucleonics • Operating Engineer • Pharmacy International • Power • Product Engineering • Textile World • The American Automobile (Overseas Edition) • The Welding Engineer

Chilton Company, Chestnut and 56th St., Philadelphia 39, Pa.
Automotive Industries • Boot & Shoe Recorder • Commercial Car Journal • Department Store Economist • Distribution Age • Hardware Age • Hardware World • Motor Age • The Iron Age • The Jewelers' Circular-Keystone • The Optical Journal & Review of Optometry • The Spectator

Dartnell Publications, Inc., 4660 Ravenswood Ave., Chicago 40, Ill.
American Business

Fritz Publications, Inc., 59 East Van Buren St., Chicago 3, Ill.
The Paper Industry

Industrial Publications, Inc., 5 South Wabash Ave., Chicago 3, Ill.
Ceramic Industry

Modern Packaging Corp., 122 E. 42nd St., New York 17, N. Y.
Modern Packaging

Modern Plastics, Inc., 122 E. 42nd St., New York 17, New York
Modern Plastics

Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa 1, Okla.
The Oil and Gas Journal

Simmons-Boardman Publishing Corp., 30 Church St., New York 17, N. Y.
American Builder • Marine Engineering & Shipping Review • Railway Age • Railway Engineering & Maintenance • Railway Mechanical & Electrical Engineer • Railway Signaling & Communications

The Penton Publishing Co., Penton Building, Cleveland 13, Ohio
Steel • The Foundry

McGraw-Hill World News Bureaus: London, Paris, Frankfurt, Tokyo, Bombay, Melbourne, Mexico City, Rio de Janeiro, Stockholm, and 60 other industrial cities.

5 Timely McGRAW-HILL BOOKS

MODERN QUALITY CONTROL: Principles, Practice, and Organization

By A. V. FEIGENBAUM, Secretary, Quality Control Coordinating Committee, General Electric Company. February, 1951. 443 pages, $7.00

This is the first book in the industrial management field to treat the subject as an overall management control rather than as an isolated, individual method. While methods of quality control are discussed, the primary object of the book is to give the reader practical knowledge of how to introduce and maintain a quality control program. Quality control is here presented as an industrial management tool for improving product quality and design and for reducing operating costs and losses. Following "Principles of Quality Control," the introductory presentation of fundamental operating rules, the book is divided into four parts: Part I, Quality Control—Tool of Management; Part II, The Statistical Point of View; Part III, Applying Quality Control in the Plant; and Part IV, Introducing Quality Control into the Plant.

HOW TO WRITE A SPEECH

By EDWARD J. HEGARTY. February, 1951. 240 pages, $3.50

With 25 years' experience in formal and social speechmaking, the author has developed a few simple rules and procedures for the preparation and delivery of a speech which will be infinitely helpful to anyone who must speak in public. He advises the reader to make a rough outline of his speech and to break this outline down into units, each of which can be prepared separately—though the conclusion should be written first. He points up the value of opening a speech with humor, dramatizing its high points, and sprinkling it with topical references, anecdotes in point, and names familiar to the audience. He follows this formula for composing the speech with a check-list of items that should be covered. With his practical formula and clear and specific suggestions, Mr. Hegarty makes the writing of any speech an easy and enjoyable task.

EFFECTIVE ENGLISH

By CLARENCE STRATTON. January, 1951. 336 pages, $4.50

Here is a book which shows the reader how to make all four aspects of language—reading, listening, writing, and speaking—work effectively and profitable at all times. In an easy and logical development Dr. Stratton shows first how to put one good word after another, then proceeds to sentences and paragraphs. He demonstrates how to outline and develop the subject matter by making the right beginning and expressing simply and forcefully the ideas to be presented. Individual chapters consider various kinds of writing—description, explanation, narration, reasoning, criticism, etc. There are also several essential chapters on business letters, personal letters, and written reports. *Effective English* will help everyone who wishes to better his business or social position by acquiring a more complete mastery of the English language.

MARKETING RESEARCH

By ERNEST S. BRADFORD, Assistant Professor of Business Administration, Manhattan College, New York. February, 1951. 379 pages, $5.00

Describing the principles and procedures employed in successful marketing research, this book discusses such basic aspects as how to analyze products and services, how to determine the character and volume of consumer demand, and what channels to use to get the product or service to market. Emphasis throughout is on how to secure marketing data and how to present them effectively. Following are the topics covered: what marketing research is and what preparation to make for it; the product, the market, and methods of getting the product to market; scientific methods in research: situation analysis, sampling, framing the questionnaire, gathering and organizing the data, and preparing the report; methods in advertising research; economic and industrial surveys; special lines of research such as radio rating and readership analysis; graphs as research tools; postwar developments in research.

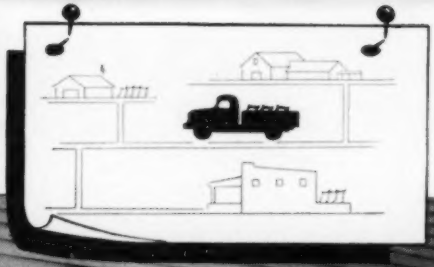
CHEMICAL ENGINEERING FOR PRODUCTION SUPERVISION, New Second Edition

By DAVID E. PIERCE, Chief Engineer, General Aniline and Film Corp., New York City. *McGraw-Hill Chemical Engineering Series.* December, 1950, 290 pages, $4.00

The aim of this book is to provide a concise, factual presentation of fundamental principles of chemical engineering needed by supervisors in plants of the chemical and allied industries. The presentation is clear and simple with enough illustrative examples to enable the reader to solve problems arising in his own plant, as well as those given in the book. The first chapter supplies the fundamentals of physics and chemistry necessary to read and use the rest of the book intelligently. No previous training in these subjects or in calculus is needed; high school mathematics is the only prerequisite. An entirely new chapter has been added in this new edition on the basic principles of absorption, a unit operation which has become of greatly increased importance since publication of the first edition.

McGRAW-HILL Book Co. 330 West 42nd Street, New York 18, N.Y., U.S.A.

There's something for YOU...
Consult your nearest Canadian Government Trade Representative for full information, or write direct to The Administrator, Canadian International Trade Fair, Toronto, Canada.
Both for buying and for selling, Canada is one of the world's great markets.
AT THE
CANADIAN INTERNATIONAL
TRADE FAIR
TORONTO MAY 28 – JUNE 8, 1951
DEDICATED TO THE PROMOTION OF INTERNATIONAL TRADE BY
THE GOVERNMENT OF CANADA
51-11E



Turning ideas into action

Right for cargo, hauling time and distance—that's the answer when you use International Trucks! So plan to speed up schedules and cut costs with more miles from an International's daily operation.

Sure cure for time and distance

Light-duty International Trucks handle like "lightweights" but they stand up under the tough jobs like real "heavyweights." That's because rough-and-ready Internationals are Heavy-Duty Engineered throughout . . . a product of the same truck building skill that has maintained International heavy-duty leadership for 18 years.

Heavy-Duty Engineered stamina means day-in and day-out dependability. It's that extra strength in every part of every light-duty International. The results give a new standard in light truck operation.

This complete truck line offers nine basic light-duty models from 4,200 to 8,600 pounds GVW. Ask your International Distributor how one can be fitted to your requirements. International Harvester Export Company, 180 North Michigan Avenue, Chicago 1, U. S. A.

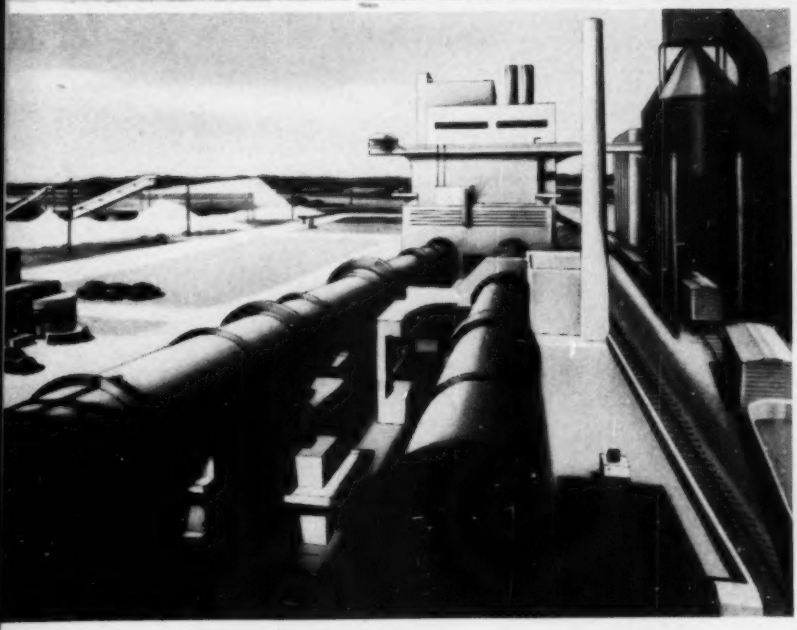
Builder of essential equipment for essential work.

INTERNATIONAL HARVESTER

McCormick International Farm Tractors and Farm Equipment • International Trucks
International Industrial Power • International Harvester Refrigeration

ALLIS-CHALMERS

SERVING ALL INDUSTRY FOR MORE THAN A CENTURY



Electrical Equipment

Steam and Hydraulic Turbines, Condensers

Crushing, Cement and Mining Machinery

Centrifugal Pumps, Motors and Control

Flour Mills, Wood Processing Machinery

Production Line for PROGRESS!

OUT OF THE HEAT of giant kilns like these comes low-cost versatile cement—symbol of progress and good living.

Allis-Chalmers has played an important role in the growth of the cement industry all over the world . . . supplying motors, kilns, crushers—and in many cases equipment for complete plants.

In fact, Allis-Chalmers builds specialized machinery for almost every basic industry, including mining, ore processing, pulp and paper, electric power, and steel. This equipment is designed to eliminate parts breakage and reduce downtime. Buying from this single reliable source simplifies ordering and installing, and assures undivided responsibility.

For help with machinery problems, consult the Allis-Chalmers representative in your country, or write:

ALLIS-CHALMERS MANUFACTURING CO.
General Machinery Division
Milwaukee 1, Wisconsin, U. S. A.

BASIC MACHINERY FOR THE WORLD'S MAJOR INDUSTRIES